

NETWORK WORLD

THE WEEKLY FOR LEADING USERS OF COMMUNICATIONS PRODUCTS & SERVICES

VOLUME 3, NUMBER 36

NOVEMBER 10, 1986

▶ STRANGE BEDFELLOWS

NATA courts BOC partners

Centrex deals sought.

BY BOB WALLACE
Senior Writer

ST. LOUIS, Mo. — A program sponsored by the North American Telecommunications Association (NATA) to position telecommunications equipment vendors as service/system sales agents for Bell operating companies was applauded at the group's annual conference here last week.

Association President Edwin Spievack said that, in the last 18 months, 300 of NATA's 650 interconnect members — including suppliers of PBXs, key systems and ancillary hardware and software — have collectively gained roughly \$7 million by working with BOCs.

Before the divestiture of AT&T, NATA members competed against BOCs, which sold communications packages that included AT&T equipment, service, support and

See **NATA** page 7

▶ LARGE-SCALE LANS

Mammoth local net to support USAF cadets

BY KARYL SCOTT
Washington, D.C. Correspondent

COLORADO SPRINGS — The U.S. Air Force Academy said last week that it is implementing a sprawling \$7 million local-area network designed to support a plethora of data and video applications for 7,000 personal computer users over 250 miles of dual broadband coaxial cable.

The academy's Falcon Net, designed by Contel Federal Systems of Fairfax, Va., comprises three main components: the coaxial cable plant, which will carry data and video to dorms, classrooms and auditoriums; network interface units, which attach to the cable and perform data conversion; and three Digital Equipment Corp. 8650 host computers.

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FEATURE FOCUS

Smart facility management exterminates network bugs

BY JOHN F. O'NEILL
Special to Network World

Part one of a two-part series.

Whether a user's network's forte is voice or data communications, the job of managing it is becoming more complex and taking on more of the aspects of gen-

eral corporate management.

Corporate MIS and communications departments are not just service departments anymore; they are profit-and-loss centers that are expected to be self-supporting. Especially in large and medium networks, facility management — optimizing the number and types of trans-

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Falcon Net on campus



▶ PRIVATE NETWORKS

San Diego crafts a cost-paring net

County puts scandal behind and builds \$12.6m integrated net.

BY MICHAEL FAHEY
Staff Writer

SAN DIEGO — On the heels of a previous scandal-ridden attempt to replace the county's Pacific Bell service with a private network, San Diego County and Contel Business Networks are nearing completion of a private voice, data and video network expected to save the county more than \$40 million over the next 10 years.

An earlier effort by San Diego County to install a \$24 million private network ended with the 1984 indictments of 11 people, including top county officials, the county's telecommunications manager, outside consultants and executives of Telink, Inc., an Anaheim, Calif.-based telecommunications vendor. A grand jury charged the defendants with money-laundering, kickbacks and bribery, including the procurement of prostitutes.

Despite the scandal, which San Diego County District Attorney Edwin L. Miller then described as "the most massive fraud and public corruption scheme ever perpetrated

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NETWORK LINE

News

DEC unwraps the Local Area VAXcluster, a clustering scheme that hooks up to 13 MicroVAX IIs through Ethernet. Page 2.

For the past year, Rolm's hiring pool has been limited to what it can cull from the IBM wellspring. Page 2.

LAN proliferation spawns the rise of diskless personal computers for use as low-cost net nodes. Page 2.

Ungermann-Bass prepares to unleash products linking network-supported PCs to a spectrum of micros, servers and hosts. The Universal Workstation Series tools are set to bow at next week's LocalNet '86 show. Page 4.

NCC Telecom is dead, but a new computer/communications show rises from its ashes. Page 7.

Features

Bank of Boston's John Doggett gives the lowdown on consultants and how to use vendors to supplement staff. Page 39.

► DEC

Low-end cluster debuts

Central software handles group control.

BY PAUL KORZENIOWSKI
Senior Editor

BOSTON — Digital Equipment Corp. last week unveiled a low-end clustering scheme that allows users to tie as many as 13 MicroVAX IIs or VAXstation IIs to a central VAX system through Ethernet. The company also introduced a series of workstations, including diskless models, designed for use in such a cluster.

At the heart of the low-end cluster is DEC's Local Area VAXcluster software, which allows a central MicroVAX or a larger VAX server to act as a control point for all systems in the work group. The central VAX system manages network software and application programs and

controls access to individual files. It also allows the participating systems to share resources such as disks, tapes and printers.

The software also aids managers in adding, deleting and managing so-called client systems in the cluster.

Client systems can be diskless workstations, a setup that allows the central VAX to maintain all data and files and reduces the per-node cost of the cluster.

Local Area VAXcluster is DEC's second cluster product. Its previously announced VAXcluster ties high-end VAX systems together through a high-speed bus. The clustering scheme has been available for a few years, and DEC said that more than 5,000 VAXcluster li-

censes have been sold, primarily to university and engineering users.

Complex applications

VAXcluster is often used with complex applications. For example, processing can be divided between a number of VAXs when an application is too large for one system to process alone. This technique, called load balancing, is another benefit clustering offers.

Local Area VAXcluster allows the Microvax II and the VAXstation II — which do not use the high-speed bus used with the VAX-cluster — to work together for the first time in a cluster.

George Weiss, analyst at Gartner Group, Inc., a Stamford, Conn., market research firm, said the new product would appeal to local-area network users. Because documents can be passed among a number of different local net users, it is difficult to ensure that users are working with the latest iteration of a document. By designating

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► COMPANY CULTURES

Rolm must hire from IBM pool?

Rolm insiders split on rumored policy.

BY JOHN DIX
Senior Editor

In an effort to thin its ranks without layoffs, IBM has for the past year required its Rolm Corp. subsidiary to hire only from within the computer giant's employee pool, a practice some Rolm insiders agree with, but one that industry watchers say in the long run may hurt the switch maker.

Although both companies deny that such a hiring policy exists, present and former Rolm employees say the practice is strictly adhered to and only overlooked in a few circumstances.

"IBM made a conscious decision to redeploy resources, as opposed to adding new resources to Rolm," said a former employee of Rolm's national accounts division who asked not to be named. "There have been circumstances where Rolm was allowed to hire from outside, but very selectively."

A Rolm spokeswoman flatly denied the statement, saying "No such IBM edict or practice exists."

The insider, however, went on to say he had no problem using IBM as a source for the sales positions he had to staff, a position reiterated by many contacts. "IBM has a surplus of people and a hell of an employee data base," said another former Rolm worker, who also requested anonymity. "If Rolm wants a guy who is left-handed, has 6.9 years of experience and an MIT degree, IBM could pull him out of a hat."

But the IBM edict may not make the best business sense. "I applaud IBM's attempts to give priority to their people," said Ed Horrell, president of Mitchell and Horrell, Inc., a telecommunications consulting firm in Memphis, Tenn. "But in reality, it's stupid. This is a very specialized business and now Rolm is bringing in a lot of computer people to run the telecom shop."

The Rolm sales employee said he soon expects IBM to loosen the reins and enable Rolm to hire outside. "In certain areas of the country where we need more sales representatives, we'll go to the out-

See **Rolm** page 42

► LOCAL NET TECHNOLOGY

LAN boom drives diskless PC market

BY MARY PETROSKY
West Coast Correspondent

The proliferation of local-area networks, with their promise of shared resources, has spawned another phenomenon — the rise of low-cost diskless personal computers.

Digital Equipment Corp. already pulled the wraps off its diskless workstation models, in conjunction with this week's introduction of its Local Area VAXcluster system (see related story above).

At this week's Comdex/Fall '86 show in Las Vegas, Nev., several vendors, including Santa Clara Systems, Inc. and terminal maker Kimtron Corp., are also expected to launch diskless personal computers designed for use on local-area net-

works. Santa Clara Systems already offers a line of diskless personal computers.

Other vendors rumored to have diskless personal computers in the wings include NCR Corp., IBM and even 3Com Corp. In addition, the number of local network vendors supporting diskless personal computers is growing.

Sharing is economical

One force behind the movement to diskless workstations is that it is more economical to share large disk drives than to outfit each user's personal computer with its own drive. Centralized backup of data is another advantage that comes from shared disk drives.

In addition, local-area network versions of application software

generally cost less than the comparable number of individual copies of the program. The ease of updating a single network copy of a particular package, rather than distributing diskettes to every user, is particularly appealing to large users.

Some observers even claim that diskless personal computers give back to MIS departments the control they lost when stand-alone personal computers mushroomed throughout their organizations.

"The MIS people lost the desktop. The diskless personal computer is their way of getting it back," said Robert David, director of marketing at Kimtron.

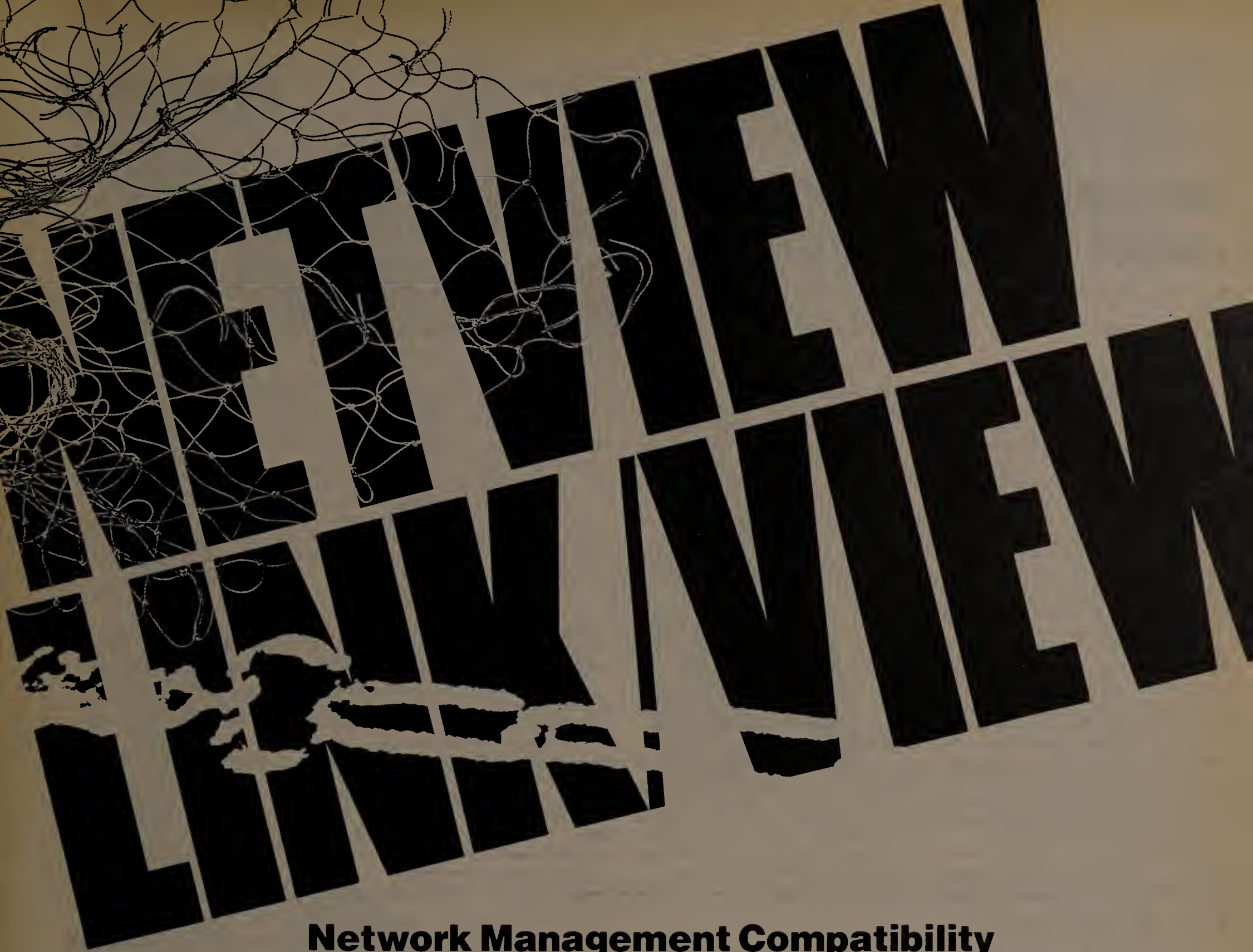
"Terminal users will love it because now they have processing

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ultimately extend end-to-end management of non-SNA Timeplex networking devices into the SNA environment. LINK/VIEW provides alarm reporting and network status displays of LINK Family products—LINK/1 T-1 Facilities Management System, LINK/2 Data/Voice Network Exchange, the miniLINK/1 and miniLINK/2 systems.

A Timeplex-developed software package, LINK/VIEW runs on the IBM NetView/PC network control processor system.

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► UNGERMANN-BASS

Net/One LAN links to major hosts expected

PC tools to support IBM, DEC and HP.

BY JIM BROWN
New Products Editor

SAN FRANCISCO — Ungermann-Bass, Inc. is poised to unveil a series of products next week that will enable network-supported personal computers to concurrently access micros, network servers and IBM, Digital Equipment Corp. and Hewlett-Packard Co. hosts, *Network World* has learned.

At the LocalNet '86 show here, Ungermann-Bass is expected to introduce its Universal Workstation Series, which includes two IBM Personal Computer AT-compatible network interface boards, the 3270 NIUpc and the NIUpc, and four software packages: Net/One 3270 PC, Net/One 3270 PC Graphics, Net/One PC and Net/One Async PC.

The firm is also expected to unwrap Data Link Bridges, network bridge products that enable Ethernets to be connected to token-ring networks locally or remotely using telecommunications facilities.

The NIUpc is a network interface unit for servers and worksta-

tions that off-loads network processing from the micro.

In workstations, the NIUpc replaces Ungermann-Bass' PC LAN card or Digital Communications Associates, Inc.'s Irma card. As a server interface unit, the device can support 96 Network Basic I/O System sessions.

The NIUpc can be field upgradable to 3270 NIUpc. This interface board adds Irma and IBM coaxial cable compatibility to the basic NIUpc and supports popular micro-to-mainframe link packages designed to work with IBM's 3278/3279 emulations adapter and DCA's Irma board. The baseband 3270 NIUpc is priced at \$1,495 and the broadband version costs \$2,145. The NIUpc baseband version costs \$1,095 and the broadband version costs \$1,745.

Servers created by outfitting IBM Personal Computer AT or compatible micros with one of these interface boards and Ungermann-Bass Net/One 3270 PC software can support concurrent connection to up to four IBM mainframe ses-

sions. The package will allow a personal computer to exchange files with a mainframe as well as to establish connection to up to 29 other network servers. A remote initial program load feature enables the support of diskless workstations.

The Net/One 3270 PC Graphics is an add-on software module to the Net/One 3270 PC package that lets personal computers access mainframe graphics applications. The package will support four concurrent host sessions and up to six programmed graphics symbols sets.

Net/One PC is the operating system used for the Universal Workstation Series server. It supports 96 users and diskless workstations. The package increases the performance of the currently available Net/One MS-Net by using disk-caching methods, asynchronous I/O processing and multitasking functions. The package allows personal computers to maintain up to 26 concurrent connections to server-based applications and up to five current asynchronous connections.

Net/One Async PC is an asynchronous communications and terminal emulation software package that supports the application program interface. The package allows Net/One-connected personal computers to access DEC VAX, HP and Data General Corp. minis at 19.2K bit/sec. It also includes a number of terminal-emulation packages supplied by various vendors. □

► T-1 MULTIPLEXERS

Avanti embraces wide compatibility

BY PAUL KORZENIOWSKI
Senior Editor

NEWPORT, R.I. — In another step toward becoming a major supplier of multiplexers for hybrid

networks, Avanti Communications Corp. last week enhanced its Ultramux T-1 multiplexers to make them more compatible with services offered by carriers such as AT&T.

With the enhancements, the

company's multiplexer is able to support two types of framing techniques. This flexibility enables the device to be used for both private and public networks.

When T-1 emerged a couple of years ago, few carrier services were available. Multiplexer manufacturers built products based on proprietary bit-interleaved framing techniques, which gave customers a good deal of flexibility in designing private networks.

Recently, carriers have added new services, such as AT&T's Megacom, that require multiplexers to support byte-interleaved framing techniques. Such techniques work only with data packaged in 8-bit increments. Thus, vendors are tinkering with their products to provide support for both bit- and byte-interleaved framing techniques.

"Compatibility with existing services is becoming a key multiplexer purchase consideration," said Brij Bhushan, president of B&C Associates, a consulting firm in Reston, Va.

Uses bit-framing techniques

Avanti's product uses bit-framing techniques. The latest enhancements enable the Ultramux to package data in a byte-interleaved manner as well. The byte interleaved capabilities enable the product to be used with AT&T services such as Megacom, Megacom 800 See Avanti page 42

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Second-class postage paid at Framingham, MA, and additional mailing offices. *Network World* (USPS 735-730) is published weekly, except for a single combined issue the last two weeks in December by CW Communications/Inc., 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171.

To apply for a free subscription, complete and sign the qualification card in this issue or write *Network World* at the address below. No subscriptions accepted without complete identification of subscriber's name, job function, company or organization. Based on information supplied, the publisher reserves the right to reject non-qualified requests.

Non-qualified subscribers: \$3.00 a copy; U.S. — \$95 a year; Canada, Central & South America — \$110 a year; Europe — \$165 a year, all other countries — \$245 a year (airmail service). Four weeks notice is required for change of address. Allow six weeks for new subscription service to begin.

Four weeks notice is required for change of address. Please include mailing label appearing on front cover of the publication.

Network World can be purchased on 35mm microfilm through University Microfilm Int., Periodical Entry Dept., 300 Zeeb Road, Ann Arbor, Mich. 48106.

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POSTMASTER: Send Change of Address to *Network World*, Box 1021, Southeastern, Pa. 19398-9979.

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*McGraw Hill's "Data Communications" Brand Preference Study cites Codex as offering the best technology, best price performance ratio, best service organization, and most informative literature for various modem and multiplexer product categories.

of relativity. An example of innovation which not only earned him a Nobel Prize, but also changed the whole way we look at the world around us.

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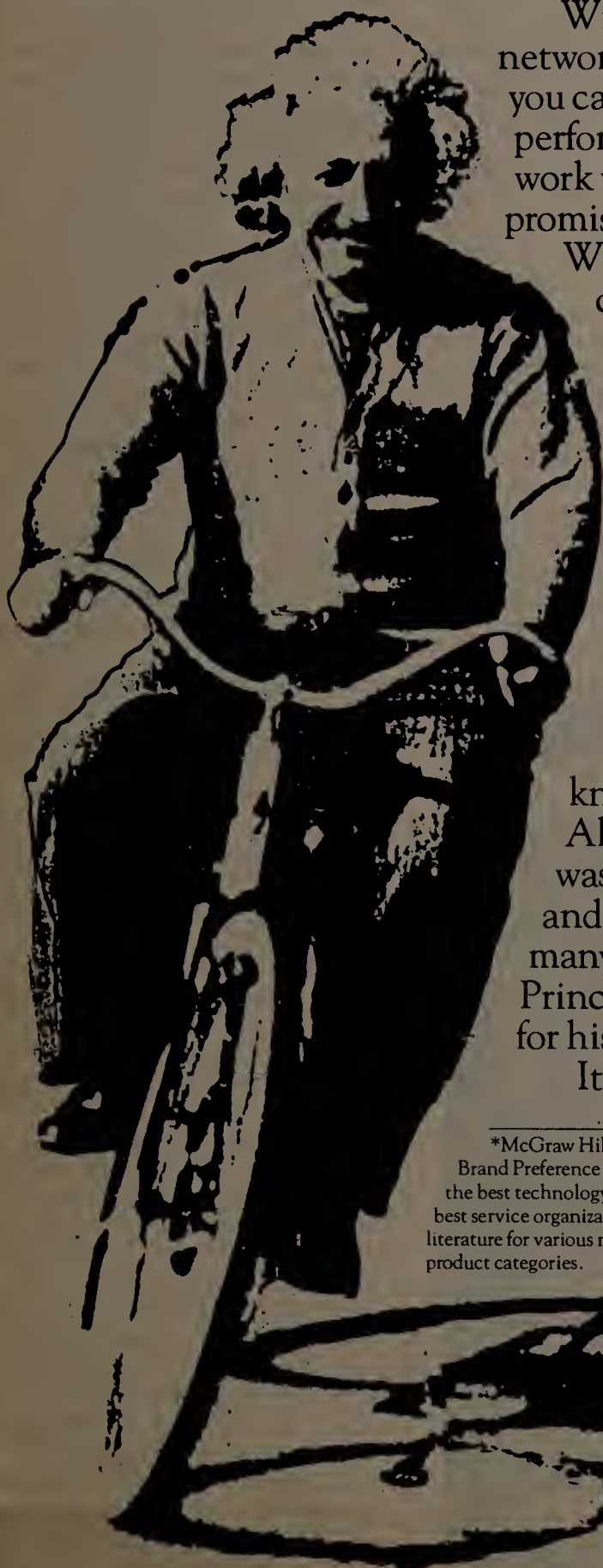
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► HEWLETT-PACKARD

DISOSS, LU 6.2 for HP 3000 bows**BY PAUL KORZENIOWSKI**
Senior Editor

PALO ALTO, Calif. — Hewlett-Packard Co. strengthens its ties to the IBM world this week with the introduction of DISOSS and LU 6.2 support for its 3000 series minicomputers and terminal emulation software for its line of personal computers.

The company also embraced AT&T's Starlan with the introduction of HP Starlan, a twisted-pair wire local network, and unveiled a building wiring scheme and software that supports remote connections to HP minis and personal computers (see related story below).

HP Officeconnect-to-DISSOSS

translates HP Deskmanager documents so they can be used with DISSOSS. HP Deskmanager is an integrated office system that includes word processing, electronic mail and spreadsheet capabilities.

DISOSS, an office system that runs under IBM's CICS teleprocessing monitor, supplies electronic mail capabilities and library services that enable a user to store documents on a mainframe that can be accessed by other users.

With the new software, an HP minicomputer can act as a receive node for DISOSS documents. The node appears to an IBM host as a Physical Unit 2.0 device and is unable to route documents among DISSOSS users. Only nodes designated

as Physical Unit 2.1 devices are able to send as well as receive DISSOSS documents. Data General Corp. is the only vendor with a DISSOSS product with that capability.

To complement its offering, HP announced HP LU6.2, communications software that enables an HP minicomputer to support IBM LU 6.2 protocols. DISOSS is one of the few applications that currently can support these protocols.

HP Officeconnect-to-DISSOSS ranges in price from \$1,400 to \$3,500. The LU 6.2 software costs between \$3,200 and \$8,000.

HP also introduced two personal computer terminal emulation packages. Both enable users to switch between a host and personal com-

puter session by pressing a single key. Both require a synchronous modem, and the company recommends that 512K bytes of random-access memory be used.

SNALink/3270 enables an HP Vectra personal computer to support up to five 3270 terminal sessions and one printer session. The product consists of a half-height expansion card, terminal emulation and file transfer software. SNA-Link/3270 will be available next month and costs less than \$1,000.

HP SNA-Link/3270 & Software Drawer is a read-only memory package for the HP Portable Plus computer. It supports two host sessions and one printer session. SNA-Link/3270 & Software Drawer also will sell for less than \$1,000 and will be available next month.

HP is ranked among the top five office automation vendors, according to Andria Rossi, president of See **3000** page 42

► LOCAL NETS

HP adopts Starlan plan
*Supportive products, services to debut.***BY MARY PETROSKY**
West Coast Correspondent

CUPERTINO, Calif. — Hewlett-Packard Co. is expected today to embrace AT&T's Starlan technology as the heart of its work group and departmental local networking strategy and is slated to introduce a series of products and services designed to support that strategy.

To date, HP has promoted Ethernet, which operates at 10M bit/sec, for work group networking, said Bernard Guidon, Network Group marketing manager. Before committing to Starlan, which uses the same 802.3 protocols as Ethernet

but is implemented over twisted-pair wiring at speeds up to 1M bit/sec, HP evaluated it against Ethernet and IBM's Token-Ring Network technology, Guidon said.

"The decision not to go with thin [coaxial cable] Ethernet was easy — we felt it was unacceptable to ask the customer to rewire," Guidon said.

The fact that Starlan uses existing telephone wiring not only reduces the cost of installing a local-area net, it also makes it easier for users to integrate voice and data eventually, he said. HP favors Starlan over token-ring technology because it offers a better cost vs. per-

formance ratio, Guidon said.

"Starlan is going to go lower in price quicker than token ring," he said. Although token ring operates at speeds up to 4M bit/sec, Guidon maintains that network performance is more a factor of network software than the network's data transmission speed.

Ethernet will still be used, but as a backbone in HP's overall networking strategy. Under HP's Starlan implementation, up to 11 network nodes can be connected to a Starlan hub. This star configuration can be used at the work group level to connect small clusters of users. Nodes can be located up to 250 meters from a hub. Users can also daisy-chain hubs up to 250 meters apart. HP provides a \$4,500 bridge for connecting Starlan hubs to an Ethernet backbone.

In addition to supporting IBM Personal Computers and compatibles, including HP's own Touch-

screen PC and Vectra PC, HP is also supplying a Starlan interface for its low-end System 3000 minicomputers. Up to 50 personal computers can be linked via hubs to a single System 3000, which can act as a network file server. This configuration is aimed at departmentwide networking.

Guidon said HP worked closely with AT&T to ensure compatibility with AT&T's Starlan products. HP's Starlan products will be available in the first quarter of 1987 and will include the following: a network interface card and software for individual personal computers, priced at \$595; a network interface card and software for a personal computer-based network server, priced at \$1,095; and an interface card for low-end HP 3000s, which will be priced under \$3,000.

HP's Starlan hub will sell for \$1,275. In addition, a Configuration and Diagnostic Pack, software designed to help with network configuration and troubleshooting, is required for HP Starlan servers. The software is priced at \$1,225 for personal computer-based servers and \$3,775 for the HP 3000.

HP also announced a program called SiteWire, a set of network wiring guidelines to be used by HP network consultants in helping users plan and design custom site wiring. HP's network consultants will work with third-party vendors in a subcontractor type of relationship for cable installation and service. SiteWire will be available Dec. 1; pricing will vary.

In a related announcement, HP also introduced the HP Serial Network, software that allows a remote HP Vectra or Touchscreen PC to communicate with an HP 3000 as if it were a node on a network. The software supports file transfer and file sharing. Previously, HP had only supported remote personal computers as terminals.

Serial Network, priced at \$295 for HP personal computers and \$550 for the HP 3000 version, will be available Dec. 1. It supports dial-up communications at speeds up to 9.6K bit/sec and is designed for occasional transmission of files. □

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► NATA CONFERENCE

NCC-Telecom is killed; joint show slated for '87

BY BOB WALLACE
Senior Writer

ST. LOUIS, Mo. — The National Computer Conference Board (NCCB) last week sounded the death knell for its fledgling NCC-Telecommunications show and entered into an ambitious effort with the North American Telecommunications Association (NATA) to organize a joint computer and communications industry conference to be held next year.

At NATA's annual conference here, the two organizations said the first such combined show will be held in December 1987 at the Infomart in Dallas. The joint conference will take the place of NCC-Telecommunications and NATA's own show. NATA officials said the industry group will focus its efforts on the upcoming joint conference.

Resources redirected to new show

According to NCCB officials, the resources the group had channeled into its short-lived NCC-Telecommunications, which debuted this past September in Philadelphia, will be redirected to the new undertaking. NCC-Telecommunications was poorly attended and offered a far leaner educational seminar schedule than was originally planned ("Show off to shaky start," NW, Sept. 8).

NCCB said it will continue to hold its flagship NCC show, which also suffered from lower than expected attendance this year. Among others, the NCCB represents the American Federation of Information Processing Societies, the Association for Computing Machinery, the Data Processing Management Association, the IEEE Computer Society and the Society for Computer Simulation.

Under the 3-year accord between NATA and NCCB, NATA will labor to create a coalition of exhibitors representing the major players in the communications, computer and office systems industries.

NATA President Edwin Spievack said the intent of the joint conference will be to introduce the 1,200 vendors, manufacturers, suppliers and users of communications equipment and services to the NCC assemblage.

Wide array of seminars

Spievack said the joint convention will boast a wide array of educational seminars aimed at providing professionals in the communications and computer fields with a better understanding of each other.

Spievack claimed that users of communications services and equipment will benefit from the attempted alliance of the computer and communications industries. "The joint venture will provide the opportunity educationally and through new marketing relations to

better serve business customers seeking systems solutions that include software, computers and communications.

"The joint venture represents one of many steps NATA is taking to reposition traditional communications equipment distributors as a dynamic new force in the marketing, sales, installation and maintenance of integrated voice/data and office automation systems," Spievack said. □

NATA from page 1

maintenance. The sales agency program was created after the implementation of the Federal Communications Commission's Second Computer Inquiry, which stipulated that the BOCs could not market equipment and services through the same division.

NATA members benefit from the program because it empowers them to act as sales agents for Centrex and other central office-based BOC services. Through such agreements with interconnects, the BOCs could avoid equipment and service marketing costs by allowing interconnects to act as their sales agents.

The success of the program is predicated on the ability of the once-warring factions to keep

peace. Before this program was initiated, much of NATA's interaction with the BOCs had been in the courtroom.

But NATA's desire to formalize tenuous current agreements with the BOCs faces two other major obstacles. The Federal Communications Commission's Third Computer Inquiry is expected to eliminate the need for the BOCs to establish separate subsidiaries for the sale of customer premises gear. Once this constraint is lifted, the BOCs would be free to again bundle services with equipment.

NATA must transform the often adversarial relationship with the BOCs into one that enables these two groups to coexist. If NATA can successfully formalize relation-

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ships with BOCs, the strategy could provide interconnects with millions of dollars above and beyond the increased equipment sale revenue they have already enjoyed.

That revenue, Spievack said, is sorely needed. "Interconnect vendors have said the sale of CPE is not going to be enough," he said. "The interconnect industry's future lies not only in CPE sales but also as telecommunications management and information service providers."

Data from the 1986 NATA Statistical Review, released at the show, said the interconnect industry's overall annual revenue will rise only \$1.37 billion between 1986 and 1990.

Spievack said of the sales agency

program: "Over the last 18 months, NATA has worked to improve relationships with the BOCs. We want to put the hostilities of the past behind us."

"No strong relationships between NATA and the BOCs have existed in the past," according to John Malone, president of the Eastern Management Group, a Parsippany, N.J.-based market research and consulting firm. "NATA is sending a signal to BOCs not represented on NATA's board that it wants to begin a dialogue in boardrooms, not in courtrooms."

Peter Koelle, president of Koelle Electric, a Lemont, Pa., intercon-

nect and NATA member, said the NATA program could prove financially beneficial to both interconnects and BOCs. "It means we'll have to start viewing the BOCs as friends instead of as enemies," Koelle said.

Donald Dittberner, president of Dittberner Associates, Inc., a Bethesda, Md., telecommunications consulting firm, said the sales agency program, coupled with the merging of the NCC-Telecommunications and NATA '87 shows, is a long overdue move. "The program could especially help supplement the sales of small interconnects," he said. **■**

More news: page 41

► NATA CONFERENCE

PBXs, key systems air at show

TIE debuts Morgan mid-range system.

BY BOB WALLACE
Senior Writer

ST. LOUIS, Mo. — Amidst other vendors' low-end product unveilings, TIE/communications, Inc. used last week's North American Telecommunications Association conference here to launch a digital, voice/data private branch exchange targeted at mid-sized users.

TIE's Morgan PBX boasts a maximum capacity of 48 trunks and 144 stations. The Shelton, Conn.-based vendor's PBX features a 16-bit Motorola, Inc. 68000 microprocessor. The system provides simultaneous transmission of voice and data over one-pair wire with triple 64K bit/sec pulse code modulation scheme for digital transmission.

"The system provides simultaneous transmission of voice and data over one-pair wire."

A TIE spokesman said the Morgan system costs \$325 to \$425 per line. The price does not include installation charges. The system will be available in the first quarter of 1987.

Thomson-CSF Communications, Inc., an Alexandria, Va.-based vendor, added a PBX to its line of small key and hybrid telecommunications systems. The firm's Opus PBX can handle 28 trunks or a maximum of 120 stations. The PBX is available in either 64- or 144-port configurations.

Both Iwatsu America, Inc., of Carlstadt, N.J., and Walker Telecommunications Corp., of Hightstown, N.J., unveiled new key systems at the show.

Iwatsu's Omega Phone IV ZT-D is a digital, Centrex-compatible system. It is available in 6-line/16-station, 8-line/24-station, 12-line/32-station and 24-line/64-station models.

Walker's Marathon analog key system is available in 6-line/12-station, 18-line/36-station and 30-line/60-station models. These units can be equipped with Marathon Voice-Processing, an optional, integrated voice-messaging product. **■**

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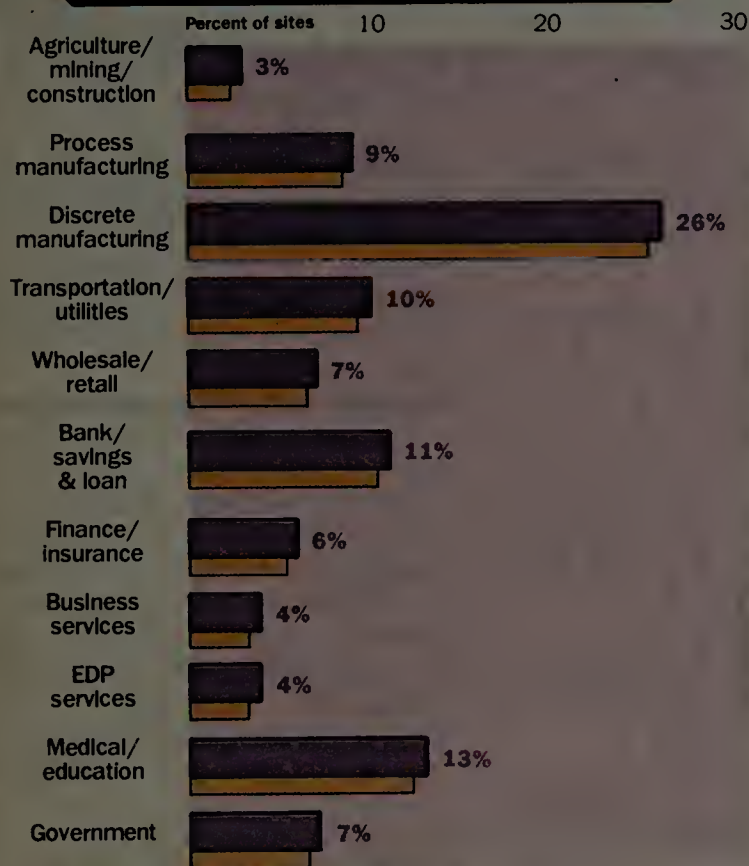


INDUSTRY UPDATE

“ISDN will not create any capabilities or applications that are not available through other methods. However, it will create new business opportunities primarily as a result of efficiently implementing and expanding the capabilities developed in other ‘precursor’ services. The major risks to be encountered in implementing the business opportunities are attributable to an insufficient level of applications understanding on the part of both users and vendors.

From ISDN Business Opportunities
Perspective Telecommunications Group
Franklin Lakes, N.J.

Industry profile: installed T-1 facilities



EDP = electronic data processing

SOURCE: COMPUTER INTELLIGENCE, BOSTON

GLOBAL NET MANAGEMENT

PacTel preps to tackle LAN market

Company shows signs of expanding service.

BY PAM POWERS
Senior Editor

PacTel Spectrum Services, Inc. has made great strides since its genesis a year ago and now may be extending the reach of its network management service to the customer premises and into the local-area network with the help of major local network vendors.

The company has given some indication of future services extending beyond the wide-area network, a move that would give the company a decided edge in global network management services.

Spectrum Services began as a wide-area network management service for smaller users whose communications facilities

were valuable but too small to warrant hiring a staff of technicians and investing heavily in diagnostic equipment. The service provides highly detailed diagnostic information on analog or digital networks, T-1, packet switching, direct dial service, dial tandem, satellite and just about any other medium, according to Larry Nebel, vice-president of marketing and sales at PacTel.

PacTel monitors customer networks through response centers that contain equipment ranging from standard data-scopes to highly sophisticated proprietary hardware and software. Experienced technicians monitor and maintain the management centers.

See PacTel page 10

BRIEFS

France's **Compagnie Generale d'Electricite S.A. (CGE)** and **ITT Corp.** of the U.S. agreed last week to broaden the pact covering their planned joint venture in telecommunications.

The agreement will now encompass the two firms' fiber-optic cable activities. The holding company will be based in the Netherlands.

The move will diminish the cost of the operation for CGE. According to the agreement, CGE will add its 75% owned subsidiary, **Cables de Lyon S.A.**, to the deal. The inclusion of Cables de Lyon lightens the financial burden of the overall transaction on CGE.

The two firms announced plans this summer to merge ITT's operations and CGE Alcatel, CGE's telecommunications arm. The venture would become the second largest communications firm in the world, after AT&T, with annual sales of \$9.6 billion and activities in 75 countries. Under the new plan, CGE would lead a consortium holding 65% of the venture, while ITT would claim 35%.

\$

Dean Mack, **Equatorial Communications Co.** president and chief executive officer, resigned last week. Mack indicated he would pursue personal interests. Equatorial, struggling with sluggish VSAT sales, recently laid off about 20% of its work force.

See Briefs page 10

INDUSTRY EYE PAM POWERS

Dynatech's deals show golden touch

Even while some companies fall into states of disrepair, battered by stronger competitors, newer technology and lower annual user budgets, other companies seem to have the Midas touch, turning every endeavor into profit.

For the most part, Dynatech Data Systems Co.'s luck has been this felicitous, and its reputation has gained the company high marks in the investment and user communities in recent years.

Of crucial importance to Dynatech's prosperity has been the company's care in choosing those markets in which it feels it can successfully compete. The company is a participant in several high-growth technology areas, such as network management and packet switching, and has maintained strong profiles therein, despite the presence of some industry stalwarts.

In network management, Dynatech has maintained a respectable market share. The Dynanet product line reports on network hardware failures and allows sparing and switching in the event of line failure.

Similar products are marketed

by Codex Corp., Racal-Milgo, Inc., Paradyne Corp. and several others with equal or greater success. But network management systems are evolving to embrace a much wider range of functionality, using performance measurement systems, which analyze network response time on an application basis, and matrix switches, which replace faulty equipment with spares at the central site. Few vendors offer all types of management, and even fewer have devised some method to integrate the systems.

It's here that Dynatech has an edge. The Prism performance measurement package has been well-received, as has the CTM series of matrix switches. Dynatech packages and markets the two together as well as separately. The current level of integration between Prism and the CTM switches means that the operator can program Prism to recognize bottlenecks during certain application runs and then instruct Prism to switch in more lines for that application.

A wholly owned subsidiary, Dynapac Systems Co. markets low-end packet switches and packet assembler/disassemblers

(PAD). Dynapac's low-end strategy has paid off handsomely for some years now. Last year, the company took a considerable risk by deciding to play in the private packet network field, which is heavily populated with well-entrenched vendors and necessitates an entirely different sales and support strategy from the low-end PAD market.

There seems to be a proper commingling of fear and respect in Dynatech's approach to high tech. While the company is not an innovator in new types of products or unprecedented product functionality, it keeps abreast of trends and has trained an eagle eye on potential opportunities in new areas.

An aggressive acquisition strategy has accelerated the expansion of Dynatech's product line. Having confirmed the viability of the multiplexer market, the company acquired Bayly Engineering, Ltd.'s T-1 multiplexer line in 1985 and, in 1986, rounded out its multiplexer line with the acquisition of Reif Communications, Inc., a maker of subrate multiplexers compatible with AT&T's Dataphone Digital Ser-

See Dynatech page 10

PacTel from page 9

Nebel said the response to the service has exceeded the company's expectations and that now PacTel services a wide range of users, with contracts running from \$15,000 to \$350,000 per year.

The prospects look good, but there are potential stumbling blocks. PacTel has some direct competition in the form of AT&T and US West, Inc. and some indirect competition in the sophisticated management systems sold by a wide range of vendors. And, Nebel admitted, "It's a tough buying decision for people. There isn't any history backing this idea — we're still breaking new ground."

It appears, however, that PacTel may have opportunity delivered to

it on a silver platter. A "major national computer vendor that provides maintenance services, and a major 3270 replacement vendor" recently approached PacTel in the interest of working together to provide management services with equipment, according to Nebel.

Vendors, once wary that Spec-

trum Services would infringe on their territory, are now taking a second look. Since PacTel provides information on symptoms, and locates faulty network devices down to the rack space, computer vendors providing maintenance services could realize enormous time savings if they were privy to those

details, he explained.

Contracts from third-party maintenance vendors would benefit PacTel immensely. But perhaps even more to its liking would be an open door to management of local-area networks. "It would be a natural extension of our service to move into the local-area net and the customer premises," Nebel said. Spectrum services now stop at the gateway to the local net.

PacTel recently signed with Ungermann-Bass, Inc. to manage and support that company's nationwide DDS network. PacTel will provide diagnostic and restoral assistance, and will coordinate future network expansion for Ungermann-Bass. As yet, PacTel will not allude to possible joint development of a local network management project, but the contract with Ungermann-Bass could conveniently lead where PacTel would like to go — into the customer premises. □

"Vendors, once wary that Spectrum Services would infringe on their territory, are now taking a second look."

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**Briefs from page 9**

Southern New England Telephone (SNET) will sell and support AT&T's private branch exchanges, the System 75 and System 85, the company announced last week. Since May 1986, SNET has been an authorized distributor of AT&T's small business systems, including the Merlin R and the EKTS 2600 products.

\$

IBM named Terry Lautenbach group executive of the Information Systems and Communications Group. Lautenbach is the former president of the Computer Products Division (CPD) under the group. The Information Systems and Communications Group is comprised of CPD, the Entry Systems Division and the Industry Systems Products independent business unit. Ellen Hancock, formerly vice-president of telecommunications for CPD, was named its president.

\$

Racal-Vadic, Inc. announced that Honeywell, Inc. will service its data communications equipment for Honeywell customers. The deal gives Racal-Vadic nationwide service coverage.

\$

Fibercom, Inc., maker of the WhisperNet fiber-optic local network, has received \$3.25 million in its second round of financing, which the company said would be used to expand sales and marketing efforts. □

Dynatech from page 9

vice. Here again, it has moved into the big leagues to compete with companies such as Infotron Systems Corp. by offering complete networking solutions.

As Dynatech's risks get bigger, so do the possibilities of failure. But the company's informal style of management has nurtured a group of employees who are typically innovative and entrepreneurial. Mixing a small company style with big company ambitions is potentially dangerous, but it has worked tremendously well thus far. □



TELECOM TRENDS

Northern Telecom demos ISDN

Northern Telecom, Inc.'s BNR research affiliate recently demonstrated Integrated Services Digital Network technology to US West, Inc. and four of its customers. The demonstration involved a DMS-100 Northern Telecom switch node and remote modules supported by fiber links. Customers included the state government of Arizona, the U.S. National Bank, Honeywell, Inc. and Mountain Bell Applications Groups. The ISDN calls included simultaneous voice and data calls.

► BOCS

Rise and fall of special access

BY JOHN DIX
Senior Editor

Private line and WATS rates will go up at some Bell operating companies and down at others if special-access rates filed early last month by local exchange carriers are implemented on Jan. 1 as planned. Rates at a few BOCs will remain stable.

There seems to be little rhyme or reason behind the proposed changes. Recurring monthly service fees for special-access channel terminals are slated to increase 96% in some states and drop 21% in others.

"The very uneven pattern of rate changes will continue to cause headaches for communications managers because the state-by-state differences will perpetuate

'rate churn,'" according to Page Montgomery, vice-president of Economics and Technology, Inc., a Boston-based consulting company specializing in tariff analysis.

Special-access channel terminals are circuits provided by local telephone companies that link customers to long-haul carriers' networks.

A simple long-haul point-to-point private line, for example, will include charges for four monthly channel terminals: one for the facility that links the customer's premise to the local telephone company's switch; a second fee for the line between the telephone company's switch and the long-haul carrier's network; and two similar fees at the other end of the circuit.

WATS lines include charges for one special-access terminal fee, the link between the customer's pre-

Comparison of recurring charges for sample voice-grade special-access channels

State	Carrier	Present		Proposed		Change	
		5-mile	75-mile	5-mile	75-mile	5-mile	75-mile
Arizona	MNTN	138.31	217.53	101.04	279.28	-27%	28%
California	PACB	133.25	306.12	141.41	213.21	6%	-30%
Florida	SBTC	130.57	211.28	156.22	314.50	20%	49%
Georgia	SBTC	116.83	190.50	115.48	265.73	-1%	39%
Illinois	ILLB	127.13	261.86	85.46	135.16	-33%	-48%
Missouri	SWBT	161.26	488.78	142.72	435.78	-11%	-11%
New Jersey	NJBT	92.60	148.79	92.60	148.79	0%	0%
New York	NYTC	165.44	261.40	189.11	337.35	14%	29%
Ohio	OHIO	146.56	408.72	111.44	237.44	-24%	-42%
Pennsylvania	BTPA	115.35	255.89	118.80	257.88	3%	1%
Texas	SWBT	127.67	269.72	123.75	261.37	-3%	-3%

MNTN, Mountain Bell; PACB, Pacific Bell; SBTC, Southern Bell Telephone and Telegraph Co.; ILLB, Illinois Bell; SWBT, Southwestern Bell Telephone Co.; NJBT, New Jersey Bell; NYTC, New York Telephone Co.; OHIO, Ohio Bell; BTPA, Bell of Pennsylvania.

Sample rates are for a two-point, four-wire analog circuit with signaling. Sample assumes that an inside wiring charge is applicable, and that special-access surcharge and message station equipment recovery charges are not.

SOURCE: ECONOMICS AND TECHNOLOGY, INC., BOSTON

mise and the local telephone company.

Long-haul carriers pay the special-access channel terminal fees to the local telephone companies and pass the costs on to users in their own end-to-end tariffs.

Comments on the special-access
See **Rates** page 12

► LAN WIRING

Ericsson plays out cable hand

OVERLAND PARK, Kan. — Ericsson Cables, a subsidiary of Ericsson, Inc. located here, has been reorganized to include a new group called Cabling Systems, which is intended to provide end-user cabling and local-area net wire products.

Parent company Ericsson is a Richardson, Texas-based vendor of private branch exchanges and other types of communications equipment. Ericsson, in turn, is wholly owned by Sweden's L.M. Ericsson, one of the world's largest providers of telecommunications equipment.

The reorganization of Ericsson Cables reflects the company's intent to bolster its U.S. presence.

In addition to the new Cabling Systems group, Ericsson Cables will consist of Communications Cable, a consolidated unit, and Continental Wire and Cable, a division that remains unchanged. Cabling Systems will combine marketing, engineering and sales personnel to offer customers a focal point for the integration of cable systems and local networks.

"Cabling Systems will provide systems integration of fiber optics, enhanced copper twisted pair, plenum and nonplenum cable, and coaxial cable products with related local-area network products," the company reported. "In addition, the unit will offer complete installation service, customer maintenance support and training to meet individual customer needs." □

► LOCAL TELCOS

Users groups partially back Unity 1-A proposal

Plan promises lower long-distance rates.

BY MICHAEL FAHEY
Staff Writer

WASHINGTON, D.C. — Two major users groups recently voiced support for portions of a controversial proposal before the Federal Communications Commission that would shift local telephone company cost subsidies now paid by inter-exchange carriers to end users and thus theoretically lower long-distance rates.

The plan, called Unity 1-A, was drafted this summer by representatives from local telephone companies and telephone company trade groups.

Single line charges would double

A key part of the plan calls for single line subscriber charges to be increased from the current \$2 monthly rate to \$3 in 1987 and \$4 in 1988. As these rates increase, the fees long-haul carriers pay to access local exchanges will decrease. Plan proponents say that shift will result in savings the long-distance carriers will pass on to

customers.

Two users groups, the Ad Hoc Telecommunications Users Committee and the International Communications Association (ICA), have filed comments with the FCC supporting increases in the subscriber line charge similar to those proposed in the Unity 1-A proposal.

Since subscriber line charges were first implemented in 1984, long-distance rates have dropped by more than 20%, according to Page Montgomery, vice-president of Economics and Technology, Inc., a Boston-based consulting company. Some 18% of that decrease is directly attributable to subscriber line charges that have helped lower carrier common line access charges, said Montgomery, whose company provides economic consulting to the Ad Hoc Telecommunications Users Committee.

Carrier common line access charges are intended to compensate local telephone companies for the non-traffic-sensitive portion of their networks.

Non-traffic-sensitive facilities are the lines that connect customers to local telephone company central office switches. The costs of those facilities are fixed and insensitive to usage. Like electric or gas lines, telephone customer links have to be maintained regardless of whether or not the customer turns on a light, uses a gas appliance or picks up his telephone.

The money generated by the common line access charge is placed in a revenue pool administered by the National Exchange Carrier Association.

Under the current agreement, all local exchange carriers are required to participate equally in the common carrier line pool.

The access rates charged by local exchange carriers are uniform and based on a nationwide average of non-traffic-sensitive costs.

As part of Unity 1-A, the United States Telephone Association and other industry organizations maintain that telephone companies that have minimized the cost of non-traffic-sensitive facilities contribute more to the pool than they withdraw.

The industry groups maintain that uniform access costs unfairly penalize local exchange carriers that deliver more efficient service, leaving them with artificially high rates and vulnerable to bypass.

The ICA, however, disagreed
See **Unity** page 12

Unity from page 11

with the carriers' proposal to eliminate uniform access. "ICA believes that the commission should make no changes in the existing access charge plan beyond the orderly phase-in of the single-line subscriber line charge."

Users group opposed to proposal

In comments filed with

the FCC on Oct. 9, the Ad Hoc Telecommunications Users Committee disagreed with a Unity 1-A proposal allowing the local exchange carriers to change the method of collecting non-traffic-sensitive service provision costs without FCC approval.

"The way I read Unity 1-A is, 'If we think there is a better way of collecting non-traffic-sensitive costs

than the subscriber line charge or carrier common line charge, we should be able to do so without explicit FCC approval,'" said Joanne Hanson, of Economics and Technology.

Hanson said that, in its comments, the Ad Hoc Committee recommended that the FCC should continue to maintain its authority over the method the carriers use to recover their non-traffic-

sensitive costs.

The Unity 1-A proposal and other plans to change the implementation of access charges will be considered by a joint committee composed of FCC and state regulatory personnel.

The joint committee will make recommendations on the proposals to the FCC, which will implement changes in access charges in 1987. \square

Rates from page 11

rates filed by local exchange carriers early last month were due at the end of October.

According to Montgomery, if past practice holds true, the Federal Communications Commission will act on the rates — which may or may not be changed to reflect criticisms — by the end of December.

As proposed, the local exchange special-access rates show drastic swings up and down, depending on the carrier.

Montgomery used Economics and Technologies' Private Line Pricer, a software personal computer pricing tool, to demonstrate the range of change present in the various carriers' proposals.

In the accompanying chart, Montgomery calculated proposed monthly rates for 5-mile and 75-mile voice-grade access channel links — either between the customer's premise and the local telephone company or the local telephone company and the long-haul carrier's point of presence.

The rate calculations are for four-wire, analog circuits and include other sundry recurring monthly charges, such as inside wiring fees.

"Five miles is a very typical distance between a customer's premise and a long-distance carrier's point of presence," Montgomery explained.

"Seventy-five miles is very atypical."

In Arizona, for example, the cost of a typical 5-mile access channel is decreasing 27%, while a 75-mile channel, needed for users situated far from their long-distance carrier's point of presence, stands to increase 28%.

Other private line rate components filed by the local exchange carriers show as little stability as the access channel charges. The nonrecurring charges for special-access channel terminals — the installation fee for the facilities discussed above — also range all over the board.

BOCs in California, Illinois, New Jersey and other states are satisfied with installation rates as they are and have not filed increases. BOCs in less populated states, such as Arizona, Idaho, Maine, Vermont and Rhode Island have proposed increasing installation rates by more than 100%.

For Wyoming, Mountain Bell has proposed hiking installation rates from \$96.28 to \$240.20, nearly 150%, Montgomery said. \square

SYNCHRONOUS PACKET SWITCHING. \$50 PER TERMINAL.



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DATA DELIVERY

A DISOSS primer

Communications Solutions, Inc., a San Jose, Calif., communications vendor, recently published a report titled, "DISOSS Gateways." It describes current and future trends for DISOSS products and compares product features from seven vendors with DISOSS offerings. The report costs \$295.

► INTERVIEW

Timeplex chief speaks out

Timeplex, Inc. has successfully avoided the industry doldrums. The company, located in Woodcliff Lake, N.J., has enjoyed a steady increase in revenue, closing its last fiscal year in June with revenue of more than \$119 million.

Network World senior editor Paul Korzeniowski recently talked to Timeplex President Edward Botwinick about the company's formula for success.

What factors are fueling Timeplex's growth?

In the last few years, T-1 has been the fastest growing segment of the entire telecommunications industry. That growth rate picked up even more in the last quarter. Most current T-1 networks are in large organizations with a sophisticated in-house telecommunications staff. A larger market consists of

See Botwinick page 14



DATA DIALOGUE

DONALD CZUBEK

IBM paves the way for future hybrid networks

When IBM introduced Netview, its mainframe-based network management package, the product suffered from two limitations. Netview could manage only IBM communications products, and only products that incorporated the latest versions of Systems Network Architecture could take advantage of Netview's capabilities.

Recently, IBM opened the Netview door with the announcement of Netview/PC. This product enables non-SNA devices to send network management information to Netview, a move that broadens the scope of Netview's control.

Netview and Netview/PC are interesting products in themselves, but IBM's network management strategy can best be seen by examining the company's overall communications strategy. IBM is now calling that strategy its Open Communications Architectures.

A cornerstone of this strategy is Open Network Management, which deals with detecting and diagnosing network problems, and configuring and operating networks. An important aspect of this strategy is that it is designed to manage all network components, not only those supplied by IBM.

From a network management point of view, the structure includes three types of products. Examples of these products can be found in current IBM offerings.

Czubek is president of Gen2 Ventures, a Saratoga, Calif., company specializing in multivendor connectivity.

The first type is known as a focal point. A focal point is the component that provides centralized control of the network. Control functions would include problem determination, problem resolution and change management. All examples of focal point products reside on an IBM mainframe: They include Netview, Distributed Systems Executive, which supports change management and library functions, and the Network Performance Monitor. The fact that all of these products are mainframe-based means that the user has a centralized network management system.

The second type of product involves an entry point. An entry point is an SNA-compatible product that, in addition to SNA application-level communications support, contains network management support for itself and its attached devices. These products are capable of sending alerts and status information to a focal point. Examples of entry point devices include the IBM 3174 cluster controller, System/36, System/38 and communications processors such as the 3720 and 3725.

A network made up of only SNA products would consist of a focal point that acts as the control center and a number of entry points that feed control information to the focal point.

When non-SNA products are included in the network, the network requires a third type of product called a service point. A service point acts as a pipeline between the non-SNA products

See Netview page 15

► CAMPUS CONNECTIONS

Statewide net to link schools, labs

New York builds data highway.

BY MICHAEL FAHEY

Staff Writer

NEW YORK — A consortium established by the state of New York unveiled plans recently to construct a high-speed data communications network that will link computers and supercomputers at 14 state universities and the Brook Haven National Laboratory, in Brook Haven, N.Y.

Nysernet, Inc., a nonprofit group, will implement the packet-switching network, which will transmit data at 56K bit/sec between net locations. The network will comprise six regional packet nets to be built and operated by New York Telephone Co. and Rochester Telephone Corp. A subsidiary of Rochester Telephone, RCI Corp., will link the packet nets across local access and transport areas.

According to a Nysernet spokesman, the transmission speeds offered by the network will allow users to access supercomputer facilities at Cornell University in Ithaca, N.Y. He said speeds of less than 56K bit/sec are too slow to allow users to take full advantage of the supercomputers.

The Cornell facility is connected to the National Science Foundation Network (NSFNET), and users of the New York network will be able to access NSFNET's resources.

"The network is significant because it will allow researchers to have access to facilities across the state, including supercomputers," said William Schrader, president of Nysernet.

In addition to linking the universities and Brook Haven Laboratory, New York-based companies will be allowed to tie into the network, according to Schrader. A New York Telephone spokesman said if sufficient demand exists, New York Telephone will make the network service available to all of the customers on its switched public network.

The network's \$5 million dollar construction cost will be provided by private and public sources, Schrader said.

Among the universities linked to the net will be four State University of New York locations, Rensselaer Polytechnic Institute and the University of Rochester. Brook Haven is a federally funded research facility owned by the U.S. Department of Energy. □

Botwinick from page 13

companies that are not yet ready to assimilate the technology. Most networks are in multibillion-dollar organizations. In our last fiscal year, we had revenue of \$119 million. Yet, we have three T-1 lines, and we find them cost-effective.

Who are your chief competitors?

We see our business as supplying networking T-1 multiplexers, and we think we have 75% of that market, so there aren't any major competitors. We recently scaled down a few of our multiplexers, so they are reasonably competitive with point-to-point offerings. These products have not been out long enough for us to determine whether or not they will be successful.

Some analysts would point to Network Equipment Technologies, Inc. as Timeplex's principal competitor, and there has been widespread speculation concerning NET's relationship with IBM.

We are cooperatively marketing products with IBM and have been doing that for a long time. If a customer tells IBM to extend its support from the computer system to a wide-area network, IBM will do that. The customer specifies which vendors' equipment it wants. If IBM feels comfortable working with the vendor, the company will do that. NET has tried to create the illusion that they have a special relationship with IBM. NET doesn't have anything special. We have had the same arrangement with IBM, a large Timeplex user.

There have been reports that IBM has recommended NET equipment to customers. Are you aware of any cases where this has occurred?

We have not come across any such cases and would be surprised if that was the case. IBM has a corporate policy of not making such recommendations.

Competitors such as Digital Communications Associates, Inc. and NET recently acquired other companies. Does Timeplex have any plans to follow suit?

With our high stock price and a lot of cash in the bank, we can do it if we choose, but we haven't seen any acquisition that makes sense. We've found that acquisitions fall into two classes. One is a troubled company.

Frankly, we do not have the management time to deal with the turnaround of a troubled company. Second, there are small companies with good product lines that are run by entrepreneurs who make the company successful.

We've found in several cases that the small company's corporate culture was so different from ours that the people who made the company go would not fit into our organization. If we did buy the company, we would end up losing a lot of what we were buying. We made one small acquisition several years ago and sold it a year and a half later. We are continuing to look, and if the right opportunity comes along, we will take it.

What would be the right opportunity?

Obviously, we are not going to move into the computer, PBX or telephone business. But there are a number of other products we connect to that our customers would buy from us if we made them available.

What percentage of Timeplex's overall revenue does T-1 supply?

In our last fiscal year, our T-1 offerings made up a majority of our revenue, and for the last two years, it has been our most important product line. Our statistical multiplexer business and that industry in general both declined last year.

Why do you think the statistical

multiplexer market is declining?

Customers are so interested in T-1 that they have been dedicating all of their resources to developing T-1 networks and ignoring lower speed networks. Also, the statistical multiplexer business has become extremely crowded and price-competitive. Each new company comes away with 2%, 3%, maybe 4% of the market. Five new companies would take all of the market growth. Couple that scenario with price competition and revenue doesn't grow at all or it decreases.

What is the company doing to increase its share in the packet assembler/disassembler business?

A few months ago, Timeplex announced its first set of products

with full switching capability. The announcement, which was made in Europe, included a line of packet switches. The products were not released in the U.S. and will not be released here for the near term. Connectivity to public packet networks is more widely available in Europe than in the U.S. There is a good chance that we will announce those products in the U.S.

How important is the international market to Timeplex?

Last year, our international business supplied 34% of our total revenues, and it grew a little faster than the company overall. Most of our large users are multinational.

Timeplex has been talking about

What does
N.E.T. offer
that's even better
than proven
leadership in
private
networks?

a new network management package. What capabilities will that package have?

Our next network management system, Unified Network Management System, will manage other devices connected to our multiplexers. Some of these products will be manufactured by us; others will be supplied by different companies. For example, we make a product that acts as a T-1 hub and switches up to 132 T-1 lines. That will be brought under UNMS. We are working with other vendors to bring their products under the UNMS umbrella.

Is this product competing with IBM's Netview?

We worked closely with IBM on the Netview concept. We want our cus-

tomers to choose how they want to run their networks. One finds varying preferences for the highest point of network management visibility at different companies. In big IBM shops, customers may feel most comfortable with a Netview terminal as the high visibility point. That's fine with us. In shops where the telecommunications manager runs the network, the company may opt for UNMS. In terms of dollars, network management is a very small portion of the total network cost. We don't care if we sell our network management package or a low-cost software package that transmits data to a Netview Systems Network Architecture console.

Are any of your users interested

in T-3 services?

Yes, point-to-point fiber is becoming available in many locations and some users are already working with T-3. They own or lease a right-of-way and put in their own fiber. In Manhattan, a number of carriers are starting to offer fiber between office buildings.

T-3 is very cost-effective. For example, a T-3 line between New York and Philadelphia costs as much as 3½ T-1 lines, yet a T-3 line has the capacity of 28 T-1 lines. That T-3 line costs \$538,000 a year, so only large users have enough traffic to justify it.

How widespread will T-3 services become?

T-3 will not be ubiquitous like T-1

or 56K bit/sec lines. In five years, T-3 will be available in large metropolitan cities, cities that are big enough to support National Football League teams. I think that groups of users may lease a T-3 line and share it.

Consultants have talked about items such as shared tenant services, which have flopped. Shared transmission facilities are cost-effective, and they are easy to implement. □

Netview from page 13

and the focal point of the network. They allow any device or product to be controlled by a focal point. This capability is becoming extremely important because managers of large networks want to build multitechnology, multivendor networks, but they also require a central control point.

There are several examples of service point products. Netview/PC provides an open application program interface that can be used by any network component to pass diagnostic and management information to a focal point. The IBM Token-Ring Manager brings the Token-Ring into the Open Network Management fold.

Hidden beneath all these net management products is an important new technology. The technology is an extension to SNA called SNA Management Services. Capabilities provided by Open Network Management are based on SNA Management Services. SNA Management Services is a formal, published architecture that describes needed data structures and protocols. This architecture is important to systems manufacturers who build SNA-compatible products because it adds another set of requirements for SNA compatibility.

It's also important to note that this scheme broadens the scope of network management. Network management now includes not only the detection and correction of low-level problems like data link errors and modem failures but also control of distributed applications. Network management now includes diagnosis of SNA protocol logic and the reporting of application-level errors.

In a distributed processing environment, applications may be split across the network. Part of an application may run in New York, while its counterpart runs in London. When an application-level error occurs, it must be reported to the focal point, so it can fix the problem.

Open Network Management will be critical in hybrid networks. Even IBM is talking about supporting mixed protocols such as Open Systems Interconnect (OSI) and SNA on one network. Open Network Management service points will be used to funnel diagnostic data from OSI components to Netview. The same scheme will be followed for local-area networks, multiplexers and private branch exchanges. With Open Communications Architectures, IBM is laying the groundwork for management of future hybrid networks. □

Proven success.

After all, *success* is what you're after. And since a private corporate network is no small investment, you'll want to look carefully before you leap. You'll want to be sure your investment yields substantially improved information control and uptime performance. And, since profitability is the bottom line, you'll want to be sure you achieve rapid payback.

N.E.T. is in the business of success.

We realized from the start that our destiny, and the destinies of our customers, were one and the same.

That's why we set out to give our customers the capability, the compatibility and the reliability they need to stay ahead of *their* competition. That's why we set out to offer the most flexible architecture on the market, to fit each company's individual requirements and future needs.

Equally important, N.E.T. saw service as integral to customer success. That's why N.E.T. puts more emphasis, including more investment, in customer service.

The success of our customers is the best advertisement we could ask for. Take, for instance, the customer who told *Network World* that his N.E.T. T1 network system was "the most reliable piece of communications

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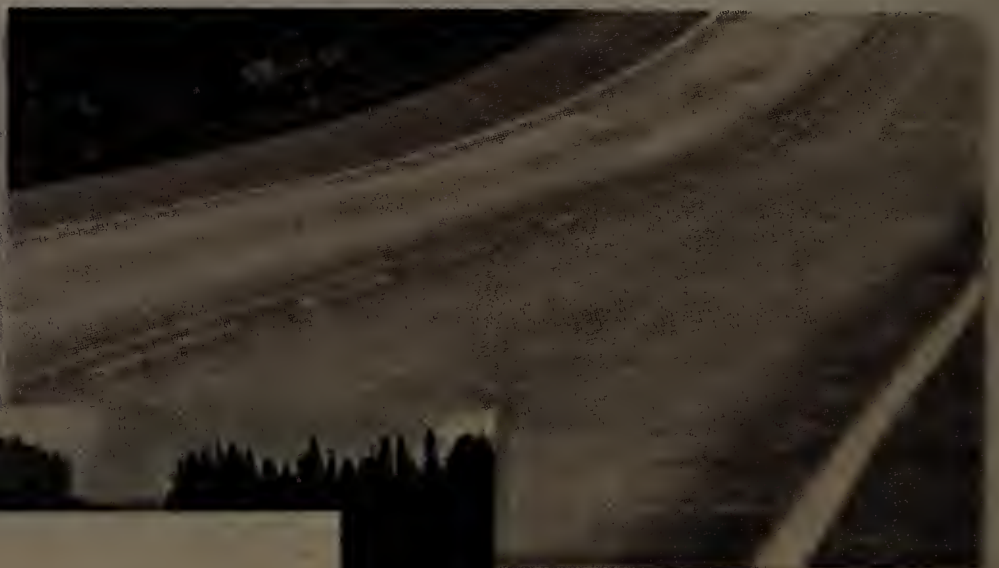
Like it or not, the multi-system environment is here to stay. Mainframes will be mainframes. PCs will continue to proliferate like mosquitoes. And user needs will change every day.

It is high time somebody created a family of computers for an evolving mixed-system environment. The time is now. The "somebody" is AT&T.

Our 3B computer family is among the first to blend the technologies of data processing and communications. Result: a unique ability to distribute processing

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AT&T's 3Bs are easily linked *up* to IBM* mainframes and *down* to any combination of terminals, peripherals, and MS-DOS** PCs. The idea is to open communication between



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3B2/310. Supports up to 14 users, 18 RS232C ports. Speed: 1.1 MIPS, 32 bits at a time. *All 3Bs are 32-bit machines.* Storage: 86MB internal hard disk; up to 516MB with Expansion Modules.

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3B2 XM. Expansion Module adds 23MB cartridge tape storage and/or 30 to 72MB hard disk storage.

3B15. Serves 16 to 60 users, 128 RS232C ports. Speed: 1.6 MIPS. Supports 8 drives, with maximum storage of 2.7 gigabytes.

Not shown: Other members of AT&T's 3B computer family serve up to 100 users, across a wide range of business needs and environmental conditions.

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systems—without forcing users to give up the applications they know and trust.

In most offices, the effect on productivity is electric.

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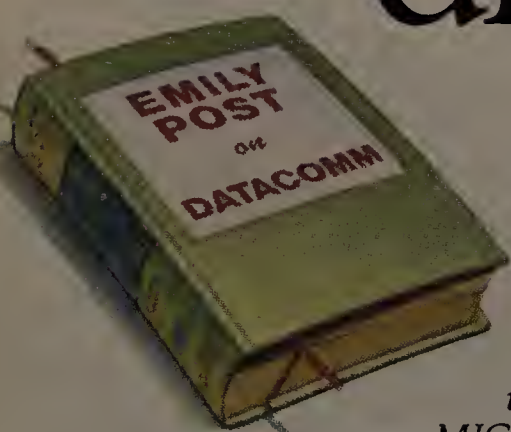


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COMMUNICATIONS MANAGER

“Privacy legislation affects the computerized collection, maintenance and transfer of personal information. Five major federal information privacy statutes exist as law: the Fair Credit Reporting Act, the Fair Credit Billing Act, the Privacy Action of 1974, the Family Education Right and Privacy Act and the Right to Financial Privacy Act of 1978.

From **Computer Security Handbook, Strategies and Techniques for Preventing Data Loss or Theft**
By Rolf Moulton, 1986, Prentice-Hall, Inc.

Performance evaluations

Performance evaluations (PE) are used in virtually every organization of more than fifty people. If your department does not use performance evaluations, now is the time to initiate them.

1. PEs confirm or correct past behavior. Your staff may be honestly unaware that their work is below par (or excellent, for that matter) unless you tell them.
2. PEs provide an opportunity for communication, and communication is essential to your success. If you manage a large department, you may rarely see some of your staff. Recognition for work contributed — superior or barely average — is essential to motivating your staff.
3. PEs provide a record of your judgement, your communication and your employee's mutual agreement. Without documentation, you may be able to convince the powers that be that someone deserves a promotion. Without documentation, you'll never be able to convince them (nor should you) that he or she should be demoted or fired. Objective information protects all of you.
4. PEs provide the most common basis for salary increases or for nonmonetary rewards where preset salary scales exist.

SOURCE: JOAN IACONETTI AND PATRICK O'HARA, *FIRST-TIME MANAGER*

MANAGERS SURVEY

Business savvy: the right stuff

Study shows less concern for technology.

BY NADINE WANDZILAK

Staff Writer

Like their MIS counterparts, communications managers are relying increasingly on their business skills rather than technical expertise to give their companies a competitive advantage.

According to a recently compiled survey

of MIS managers from Arthur Andersen & Co., the giant Chicago-based consulting firm, nearly 85% of the 120 information systems executives polled said they viewed themselves as business professionals first and technical professionals second.

In discussing areas of concern to them, information systems executives cited the importance of keeping up-to-date with technological advances. But they also focused on broader business issues, such as translating information technology into a competitive edge. There appears to be emerging a new breed of managers that is leading communications and information systems departments beyond their traditional role as support services.

In interviews with communications managers, *Network World* found similar themes. Robert Woodyard, communications manager at Atlanta-based Delta Air Lines, agreed that business savvy is becoming more important than technical know-how. “How you manage communications affects the whole corporation,” he said. “As a communications manager, you're dealing with a very technical subject, but you also have to manage it as you would a business.” Woodyard is responsible for all voice and data communications, in-house support and other communications systems for Delta.

Airlines used communications as a strategic weapon before the concept became a buzzword, Woodyard said. “Communications has become an asset,” he said. “We're dealing in a very perishable commodity — an airline seat. If you don't fill it and the plane leaves, you'll never get it back. Consequently, our performance is critical.”

Another manager sees the technical-to-business shift from a different perspective. Larry Stouder, information center manager for New York-based Continental Grain Co., has worked in both the company's finance department and its information center. Stouder supervises personal computer networking and office automation systems.

People from MIS departments usually learn about business in an MBA program, Stouder said. With his business experience, Stouder said he has a good perspective on how business people think and understands what their business needs are.

“Communications managers carry the burden of technology while sorting out the competitive advantage angle,” according to Melvyn Bergstein, one of the Andersen study's authors and managing director of that group's Technical Services Organization. “In addition, it is difficult for a com-

See **Skills** page 20

ASSOCIATIONS

The Association for Systems Management (ASM) Cooperation Committee has arranged for ASM members to have access to the Data Processing Management Association Legislative Network. The network provides members with representation on key issues before Congress and the various state legislatures by updating pending legislative and regulatory activity.

For more information, contact ASM International Headquarters, 24587 Bagley Road, Cleveland, Ohio 44138.

The Corporation for Open Systems (COS) will extend its current membership fee structure from Oct. 15, 1986 to Dec. 31, 1987. For firms joining COS during the remainder of 1986, first-year membership fees and funding amounts under research and development agreements will be considered paid through 1987.

The annual membership fee for all COS members is \$25,000. Research members pay an annual research fee of \$25,000, senior research members pay \$175,000.

After Dec. 31, 1987, the re-

search member fee will increase to \$50,000, the senior research member fee will increase to \$375,000.

Panelists will discuss how end-user training occurs in organizations, trends in training and the role of outside training firms at a meeting of the Society for Management of Professional Computing, at 11:30 a.m., Nov. 21, at Anthony's Pier IV in Boston.

For more information, contact the society at (617) 266-6800. **Z**

GUIDELINES

ERIC SCHMALL

Managers must have an outside eye

Communications managers can't remain very effective in their positions without a well-developed sense of irony. The struggle to identify, establish and enforce communications compatibility and equipment standards represents an acknowledged Sisyphean task.

Much emphasis has been given to the attachment of devices to communicate on the intracorporate network. What is often missed in this process is the increasing user demand to connect to extracorporate data bases or services to meet their special needs. Without proper management in this area, the slide into communications chaos is assured.

An integral part of the information age has been the rapid rise of specialized data services that market themselves to esoteric professional segments of an organization. There are accounting and investment services, accesses to various brokerages and market data bases, legal opinion services, actuarial services and, of

Schmall is network systems manager for an insurance holding company.

course, even specialized data bases to help communications technicians design and model voice and data networks. It's almost impossible for the communications department to keep up-to-date and aware of all the various possible agencies with which users may have a desire to conduct business.

But the individual departments are aware of these possible connections and have taken independent action to access these services. In short order, an ungoverned proliferation of special terminals, modems and dial-up arrangements to access these extracorporate networks will give the communications manager a major challenge.

It wasn't always so. In the recent past, non-technical users were forced to ask for the communications department's help in arranging for these connections. Most users had no concept of what a modem was nor any clue as to where to obtain one. Dial-up data had a sense of mystery to most potential customers. Today, much of the technical intimidation has

See **Extracorporate** page 20

Extracorporate from page 19 disappeared. Many users are self-taught data communications technicians from their home personal computer experiences. Therefore, they have no compelling reason to involve the communications department in the ordering or installation of the special access to these extracorporate networks. The eventual consequence of this newfound independence, however, is serious trouble for the organization.

The first sign

The first sign of impending disorganization is the steady emergence of various modems, terminals and special dial access equipment. Left to their own discretionary de-

cisions, independent departments will no doubt accumulate an impressive variety of types and stripes of communications equipment.

One may be equally assured that the concept of pooling lines, modems, terminals or teleprinters will not dawn on anyone. The predictable result: a combined, excessive

expenditure of capital for too much equipment, scant chance of component interchangeability and no hope for an organized maintenance program.

But wait. It gets worse. If these users decide to dial through the organization's PBX to access these outside services, it won't take long to adversely impact the company's voice traffic. Long data calls will occupy outdial trunks beyond expected limits. The unanticipated hundred call seconds load of these lingering connections can greatly fatigue many private branch exchanges.

In order to prevent this dismal scenario from becoming a bleak reality, the communications manager has to apply the same rigorous principles of organizing and directing this function that are used in intracompany connectivity.

First, a comprehensive survey of all departments' current or planned external data access operations must be compiled, analyzed and responded to. That response is a plan comprising standards in equipment selection, pooling arrangements and ideal access rules.

Project positive role

In its articulation of this plan, the communications department needs to project a positive role as facilitator and cost cutter. There is a distinct danger that the department might be perceived as an avenging, wounded bureaucratic beast ready to punish those who had the temerity to circumvent its approval process.

Careful attention to user needs in the implementation of a plan that results in a coherent and cost-efficient operation will be the final test of success.

Communications planning must embrace all facets of the served community's information transfer needs.

By including the growing requirement for access to outside data sources in this arena, managers will make significant progress in a neglected area. **■**

Skills from page 19

munications manager to talk about very expensive technology to executive management."

Ideally, information system managers and executive management will work together to integrate information technology and business strategy, Bergstein said. But information systems executives still have problems getting support and direction from senior management, he added.

The executives polled also realize they will need high-level support when they integrate office automation, information processing and telecommunications. They said the greatest barrier to that integration is incompatible multivendor hardware and software and a lack of industry standards.

Copies of the summary brochure on "The Changing Shape of MIS" are available from Richard Deabel, Arthur Andersen & Co., 43rd St. Distribution Center, 1330 W. 43rd St., Chicago, Ill. 60609. **■**

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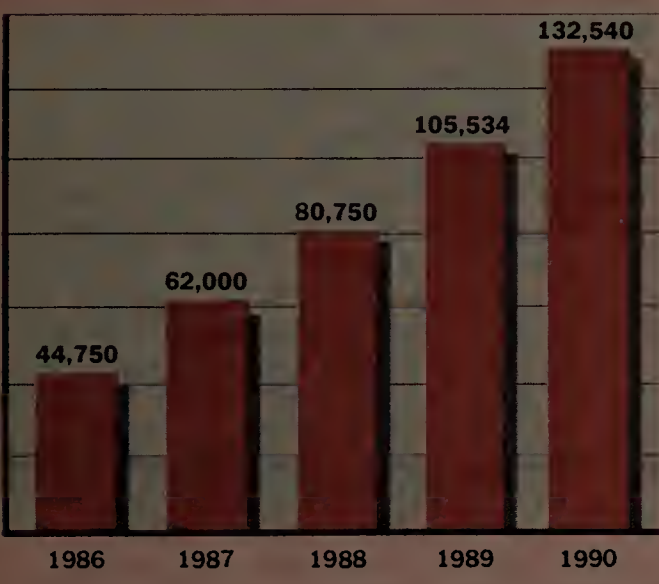


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LOCAL NETWORKING

Personal computer network shipment forecast*



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Third Localnet conference

Nearly 6,000 visitors and some 80 exhibitors are expected to be in attendance as the third Localnet conference gets under way next week at the Moscone Center in San Francisco, according to show sponsor Online International, Inc. Among the show's scheduled speakers are Charlie Bass, co-founder of Ungerman-Bass, Inc.; Sytek, Inc. Chairman Mike Pliner; and Ray Noorda, president of Novell, Inc. Sessions will focus on a spectrum of local networking issues, including token-ring technology, factory automation, micro-to-mainframe links and fiber optics.

► UPGRADE UPDATE

Proteon soups up its low-end LAN

Access unit to allow remote reconfiguration.

BY BOB WALLACE
Senior Writer

NATICK, Mass. — Proteon, Inc., one of the top manufacturers of token-passing ring local-area networks, based here, plans to break away from a voracious pack of network vendors by embellishing its low-end offering with network management capabilities.

Proteon will demonstrate at the Comdex/Fall '86 conference today, in Las Ve-

gas, Nev., a new ProNet 4 multistation network access unit that can be reconfigured remotely. The ProNet 4 multistation access unit will enable a network manager to add or delete network stations to the IBM-compatible 4M bit/sec token-ring net without taking it down, according to Howard Salwen, Proteon's chairman of the board.

As with Proteon's existing multistation access units, the new unit is capable of bypassing network ports in the event of a net-

See **ProNet** page 22

► BRIDGE COMMUNICATIONS

VAX links to TCP/IP out

BY MICHAEL FAHEY
Staff Writer

MOUNTAIN VIEW, Calif. — Bridge Communications, Inc. last week introduced two Ethernet local-area network servers designed to link Digital Equipment Corp. VAX processors with equipment running the Transmission Control Protocol/Internet Protocol (TCP/IP).

The company's Integrated VAX Ethernet Communications Server (IVECS) TCP/IP, a single-board Unibus server, and the CS/200-TCP/IP, a briefcase-sized server supporting four to 10 terminals or peripherals, run high-level TCP/IP protocols. The servers support communications between terminals, VAXs and TCP/IP-based workstations. TCP/IP is a Department of Defense standard protocol that is incorporated in the Unix operating system.

The IVECS-TCP/IP board plugs into a VAX Unibus slot and emulates up to six DEC DMF 32 I/O controller cards while establishing a direct connection to Ethernet.

The product can be used in a VAX running the VMS, Unix or Ultrix operating system. Ultrix is a DEC implementation of Unix.

IVECS-TCP/IP attaches directly to Ethernet via a transceiver, eliminating the need for an external server and cabling. The server uses a 12-MHz Motorola, Inc. 68000 microprocessor, an Advanced Micro Devices, Inc. Lance Ethernet controller chip, 1M-byte random-ac-

cess memory and a microcoded bit-slice emulation of the DMF 32 interface. It performs all protocol processing.

The CS-200-TCP/IP can act as a terminal server as well as a host, personal computer, printer and modem server for devices without integral TCP/IP support. Individual ports can be configured to support asynchronous or Binary Synchronous Communications devices. The unit allows multiple simultaneous open sessions of up to 40 sessions per server and eight sessions per port.

The CS/200-TCP/IP and IVECS-TCP are compatible with Bridge's line of TCP/IP-based Ethernet communications servers, network gateways and network management servers.

Software is loaded into both units from Bridge's NCS/150-TCP/IP network control server, which functions as a centralized boot server.

A Bridge spokesman said a DEC user can connect terminals to the CS/200 and access both IVECS-equipped VAXs and other TCP/IP hosts, such as a Sun Microsystems, Inc. workstation, across the local net.

The IVECS-TCP/IP costs \$5,900. The CS/200-TCP/IP costs \$2,600 for the four-port model and \$2,800 for the 10-port model. There is a \$750 software license fee per network with each product.

Bridge Communications Inc., 2081 Stierlin Road, Mountain View, Calif. 94043 (415) 969-4400.

LANMARKS

BOB WALLACE

Information centers can run the local net store

The creation of information centers should lessen, or even eliminate, many of the problems MIS managers encounter as they labor to monitor and coordinate local networking activities within their corporations.

The information center concept calls for the establishment of a department that would help users implement departmental processing systems. These systems would provide users with local data processing and communications capabilities.

The information center staff would track all computing resources, including personal computers, applications software and peripheral devices.

MIS managers have been faced with the tall task of coordinating the use of personal computers and local-area networks for many years. That task has often been a frustrating, fruitless one.

Countless corporations have no guidelines for the purchase of such departmental resources. Individual managers within a single company have gone their own ways and purchased personal computers and local-area nets with their department, and not the corporation, in mind.

The task of managing these diverse data domains appears too large for MIS managers to handle alone.

Scott Haughdahl, a systems analyst with Minneapolis-based Architecture Technology Corp., said many MIS managers' hands are tied.

"One would hope the corporation's MIS department could control the actions of the companies' personal computer users," he said.

"But there is little MIS can do because users are free to interact amongst themselves," he added.

The information center staff, with its archive of user information, would relieve MIS of much of that burden.

Haughdahl suggested that each of the company's departments that uses personal computers or networking gear be required to report regularly to the information center staff.

This would establish a communications path between the company's end users and those responsible for DP policy and practice.

The creation of information centers may also act as a catalyst to the formation of company users groups comprising end

See **Centers** page 22

► LAN FILE SERVERS

Lancore increases server storage

New products take bow at Comdex/Fall '86.

BY JIM BROWN
New Products Editor

WESTLAKE VILLAGE, Calif. — Lancore Technologies, Inc. announced recently it increased the storage capacity for three of its local-area network file servers. The firm also said it released three other file servers with an internal streaming tape back-up system and released a new version of its back-up file management software. The

products will be unveiled officially at Comdex/Fall '86 this week.

The desktop Core 150, fault-tolerant Core 150FT and dual disk Core 300T file servers' storage capacity was increased with the use of enhanced small disk interface (ESDI) Winchester disk drives and disk controllers.

The Core 150's formatted storage went to 144M bytes, while the formatted capacity of the 150FT was upgraded to a pair of 150M-

byte disks. The fault-tolerant model automatically duplicates each file stored on the server to ensure continued operation in the case of malfunction. The overall formatted storage for the dual-drive Core 300T went to 288M bytes.

Lancore also announced the capacity of the streaming tape file back-up system for the Core 150, Core 150FT and Core 300T file servers was increased from 60M bytes to 75M bytes.

The firm also released a Core Plus series of file servers that offer an internal 75M-byte streaming tape file back-up system. Released in the series are the Core 75 Plus, Core 75FT Plus and Core 150T Plus. The units also feature 512K of internal random-access memory and either an 8-MHz or a 10-MHz Intel

Corp. 80186 microprocessor board. The Plus series supports utilities allowing the file servers to operate with Novell, Inc.'s Advanced NetWare, IBM's PC Net, Microsoft Corp.'s MS Net and 3Com Corp.'s 3Plus network operating systems.

The recently released file servers range in price from \$8,495 to \$16,500.

The firm also released Larchive Version 4.0, its tape back-up system utility software. The package runs under PC Net, MS Net or 3Com network operating systems.

Larchive allows users to access tape back-up systems on the network to search for files the primary disk may no longer have. The menu-driven package provides password security to ensure that only authorized users access the back-up systems. The package also features an on-line context-sensitive help screen and also allows network supervisors to perform a file-by-file restoration from a back-up tape. Larchive Version 4.0 is included in Lancore's Core series of file servers. □

ProNet from page 21

work node or workstation failure. The new multistation access unit will feature a fiber-optic cable interface and have a battery backup that will support configuration data in the event of a power failure, Salwen said. Proteon would not enumerate the types of diagnostic tests possible with the new interface unit.

Preliminary research performed by Framingham, Mass.-based International Data Corp. (IDC) ranks Proteon as the third largest vendor of terminal/systems local networks. IDC describes terminal/systems networks as those used in minicomputer and terminal environments. The study projects that only Digital Equipment Corp.'s Ethernet and Datapoint Corp.'s Arcnet will have larger installed bases by year end.

Proteon says it intends to announce a product early next year that will enable computers using Xerox Corp.'s Xerox Network Systems networking protocol to hook to ProNet 80, its 80M bit/sec token-ring network.

Proteon also plans to beta test a product that will enable nodes on a DEC Decnet to communicate over a ProNet 80 system. The ProNet 80 can connect up to 240 host computers using either shielded twisted-pair wiring or fiber-optic cable. Both the ProNet 4 and ProNet 10 can transmit data over the IBM Cabling System, shielded twisted-pair wire, coaxial cable, fiber-optic cable or infrared links.

Salwen said he is disappointed by the amount of time required to pound out standards for fiber-optic data communications products, citing the Fiber Distributed Data Interface (FDDI) specification as an example. FDDI is an emerging standard for 100M bit/sec fiber-optic local networks. Salwen says that Proteon and other vendors of fiber-optic network components will continue to produce this gear in the absence of usable standards. "We are

not avoiding standards," Salwen maintained, "we just can't wait for them."

"The FDDI committee lost power after the Burroughs [Corp.] Sperry [Corp.] merger," Salwen claimed. The project was weakened by what Salwen said he perceives as a lessening of interest on Sperry's part after the merger. "We need a leader that is going to spend money and be fully committed to this project."

Salwen, who is a member of the FDDI committee, predicted users will not see products that implement the finalized FDDI specification until late 1988 or early 1989. "But I don't think you will see FDDI products available for quantity shipment until late 1989," he added. Salwen claimed Proteon will eventually provide products that incorporate FDDI. "Our strategy is to provide ProNet 80 users with a smooth migration path to Proteon products that incorporate FDDI if they want this," he explained.

Salwen said Proteon networks are sold equally for office networking, MIS and scientific/technological applications. Proteon's future product plans will likely be affected by the creation of fiber standards as all three of its local net offerings can use fiber-optic cable as a transmission media. Lightwave cable used as a network backbone, for example, could link multiple ProNets in a single, campuslike environment. □

Centers from page 21

users of local networks. By meeting regularly with such groups, information center staffers can monitor more closely than MIS the status of local networking projects and evolving user needs.

The information center concept has been realized within large user companies. As the strategy succeeds for these users, a growing number of other users will embrace this approach to coordinating and enhancing local networking. □

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NEW PRODUCTS AND SERVICES

See inside for:

- Fiber-optic multiplexer with RS-232 or V.24 interfaces

► SOFTWARE UPGRADE

AT&T updates Starkeeper

BY JIM BROWN
New Products Editor

MORRISTOWN, N.J. — AT&T's Network Systems Group released Version 2 of its Starkeeper Network Management System, software that monitors AT&T's central telephone switching office-based Datakit Virtual Circuit Switch (VCS) networks.

Datakit VCS is a central office service that links host computers, terminals and peripherals on a customer site to devices either at central or remote sites over the existing telephone network. It employs a virtual circuit switching scheme and supports data links at speeds up to 19.2K bit/sec.

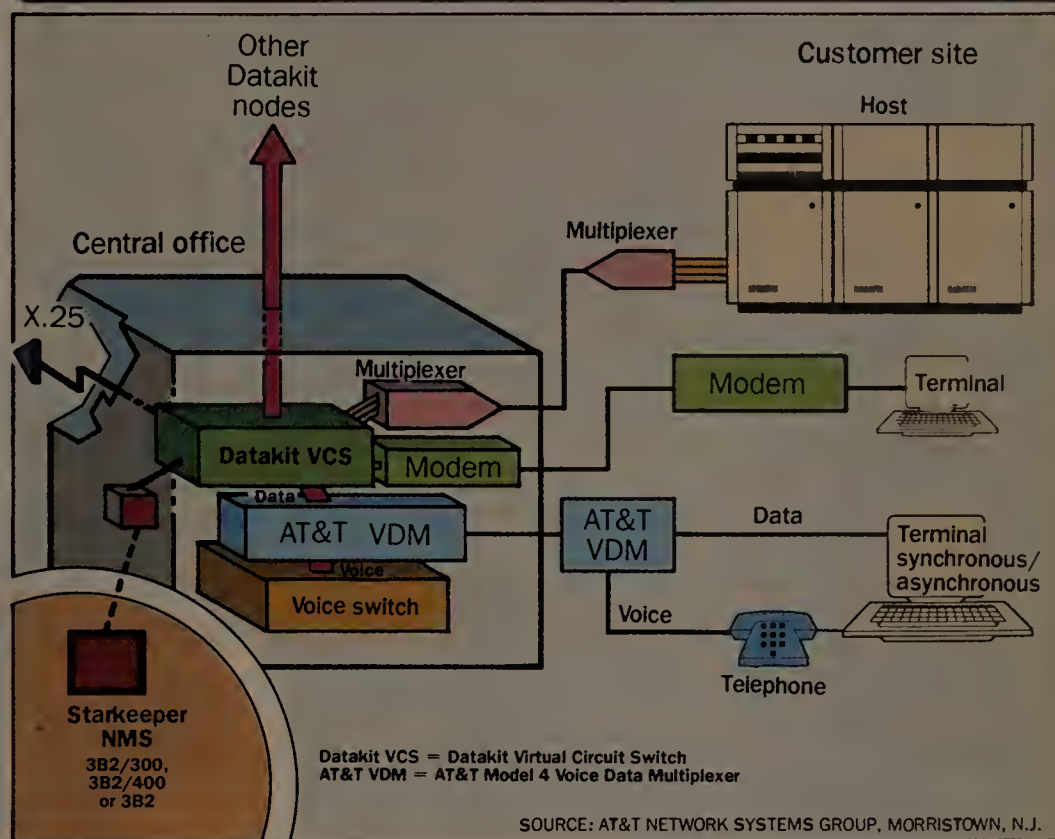
Data communications equipment such as modems and multiplexers on the customer premises transmit

to a Datakit VCS node directly, while an AT&T Model 04 voice/data multiplexer combines voice and data signals from a telephone and terminal and transmits them to the central office. Another voice/data multiplexer separates the voice and data signal at the central office, sending the voice to a voice switch and the data to a Datakit VCS. The voice is switched over dial-up circuits, and the data is switched over virtual circuits.

Datakit VCS nodes support asynchronous, synchronous, switched Binary Synchronous Communications and X.25 communications. Datakit VCS nodes can be linked to each other over 56K bit/sec Data-voice Digital Service-like lines, T-1 lines or 8M bit/sec fiber-optic links.

The Starkeeper package, running on an AT&T 3B2/300, 3B2/

Starkeeper network management system



400 or 3B5 minicomputer, actively monitors the operation of Datakit VCS nodes. It displays node status and alarm conditions in real-time and collects node performance data at user-defined intervals for stor-

age in a data base. The package also allows Datakit VCS network administrators to configure remote switches.

Datakit VCSs can be directly connected. See **Starkeeper** page 26

► PC NETWORKS

SNA, X.25 boost fortifies G/Net

BY MARY PETROSKY
West Coast Correspondent

IRVINE, Calif. — At the Comdex/Fall '86 show opening today in Las Vegas, Nev., Gateway Communications, Inc. plans to unveil enhancements to its G/SNA and G/X25 local-area network products.

The products enable users on G/Net, the company's personal computer-based local network, to conduct sessions with IBM host computers over X.25 public data networks. G/Net features a linear bus topology and operates at 1.43M bit/sec.

Combining the Systems Network Architecture and X.25 gateway functions supplies local net users with a lower cost alternative to running dedicated lines from a remote host, a company spokesman said.

Both the G/SNA and G/X25 offerings consist of software and a personal computer add-in card that turn the personal computer into a local network gateway. The company spokesman said the two products would likely be used in one personal computer to create a combination gateway, but they do not necessarily have to be configured in that manner.

The enhancements will not affect the cost of either product. G/SNA is currently priced at \$2,530 for up to eight users, and G/X25 is priced at \$2,495. A software upgrade will be available to provide current users of these products with the enhancements. Pricing for that upgrade has not yet been determined, the spokesman said.

► DOCUMENT TRANSFER

Apple-to-IBM links take leap

BY JIM BROWN
New Products Editor

The push to link Apple Computer, Inc. and IBM systems continued last month as Microsoft Corp. and Centram Systems West, Inc. introduced software packages featuring document transfer utilities.

The Redmond, Wash.-based Microsoft, developer of the IBM Personal Computer's MS-DOS operating system, unwrapped Version 3.0 of its Microsoft Word word processing package for the Macintosh. The package allows Macintosh users to work with documents created and stored on IBM systems.

Centram, a two-year-old Berkeley, Calif.-based local-area network maker, introduced software that allows a Personal Computer to print documents on an Apple-talk network-connected Laserwriter. The company's Personal Computer-resident Tops Print package converts Personal Computer print commands to Adobe Systems, Inc.'s Postscript page description formats that drive the Laserwriter.

The increasing use of Macintoshes for desktop publishing within corporations has spawned a growing need to tie the Macintosh into the large installed base of IBM Personal Computers and compatibles, said William Higgs, senior software analyst from the Cupertino, Calif.-based Info Corp. "The Macintosh is making inroads in cor-

porations, and it is going to get connected into networks that are not totally Macintosh networks," Higgs said.

Microsoft Word 3.0 allows Macintosh users to manipulate minicomputer and mainframe resident text files created under IBM's Document Content Architecture (DCA). It can also work with Ascii files and text created with other Personal Computer-based word processing packages that support Microsoft's Rich Text Format, including Microsoft Word for the Personal Computer.

In addition, Microsoft Word 3.0 for the Macintosh supports merging of text and graphics within the same document and features a Quickswitch utility that allows users to toggle between Microsoft Word 3.0 and other Macintosh applications, such as Apple's MacWrite, MacPaint and MacDraw, as well as Microsoft's Excel spreadsheet package.

"The use of DCA is a must for corporate buyers of not only the Macintosh, but of other MS-DOS word processors," said Higgs. "Microsoft saw a gap for a good heavy-duty work environment word processor in the Macintosh world and upgraded Microsoft Word Version 1.05 for the Macintosh to the level of Microsoft Word Version 3.0 in the Personal Computer world," he added.

Expected to be available in January, a See **Version 3.0** page 26



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► CAMPUS CONNECTIONS

ICS fiber multiplexer out

SAN JOSE, Calif. — ICS DataCom, a division of ICS Electronics Corp., released a fiber-optic multiplexer with RS-232 or V.24 interfaces that supports up to six Binary Synchronous Communications links.

The 2361 Bi-Sync Optical Link Multiplexer is designed for campus networks. It links host computers and terminals between floors or buildings at distances up to 1.2 miles. The time-division multiplexer operates in full-duplex mode over a dual fiber-optic cable.

The product supports channel speeds of 38.4K bit/sec and yields an overall composite link speed of more than 1.3M bit/sec. It operates with either serial control signals or X-on/X-off protocols.

Using Y-type fan-out cables, the unit can support 16 full-duplex communications links between RS-232-C devices. The Y-type adapters take advantage of unused RS-232-C pin allocations so that only six RS-232-C ports are needed to support 16 devices. The unit works with synchronous and asynchronous

transmissions simultaneously.

With this product and the previously released 2360 asynchronous fiber-optic multiplexer, the firm is aiming at data processing environments, said Tom Curfam, ICS DataCom's applications manager.

ICS DataCom's products have been sold in the engineering community for eight years. Those products link engineering computers to workstations with interfaces such as the Hewlett-Packard Co. Interface Bus and IEEE 488 standards.

The product's diagnostic capabilities include self-test procedures and a variety of local and remote loop-back tests.

The 2361 Bi-Sync Optical Link Multiplexer with a standard fiber-optic connector costs \$1,295. ☐

Starkeeper from page 23

connected to the minicomputer running Starkeeper, or a number of remote Datakit VCS nodes can connect to the minicomputer over a Datakit VCS circuit.

Starkeeper Version 2 adds the capability to display a color screen graphic depicting the Datakit VCS network with color-coded alarm and status conditions. The package also increased the number of Datakit VCS nodes a Starkeeper can monitor from 16 to 40.

In addition to performance and administration functions, the Starkeeper can be configured to keep track of data calls for billing purposes. The package will monitor who made a data call, the day and time it was started, the destination, the duration of the call and how many packets of data were transmitted.

Charges can be based on the length of data calls or the amount of data packets transmitted. The reports can be distributed to large end users that wish to charge departments for system usage or can be retained in the system.

Although Datakit VCS networks and Starkeeper are designed for use by telephone companies, a Datakit VCS node could be located at a customer site. According to John Schaefer, the sales and marketing manager for Datakit VCS service, a customer could place on its site what is called a Datakit Network Multiplexer. That network multiplexer receives Datakit VCS trunk lines from a central office, demultiplexes them and transmits the signals to local devices. That device, he added, would not do any data switching on the customer site.

A Bell Atlantic regional operating company reportedly has a customer with such a Datakit VCS network multiplexer on its site.

According to Schaefer, AT&T Network Systems Group is in the process of determining whether there is a market for Starkeeper among large end user accounts.

A Starkeeper package monitoring between eight and 40 Datakit VCS nodes ranges in price from \$25,000 to \$65,000. ☐



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Version 3.0 from page 23

non-copy-protected Microsoft Word Version 3.0 package for the Macintosh will sell for \$395. Current users of Version 1.05 can upgrade for \$99.

In addition to the Laserwriter, the Tops Print package allows the Personal Computer to use an Apple Imagewriter II or other Postscript-driven printers. The \$189 Tops Print package requires the Personal Computer to use an interface board with an Appletalk type connector to join either an Appletalk or Tops network.

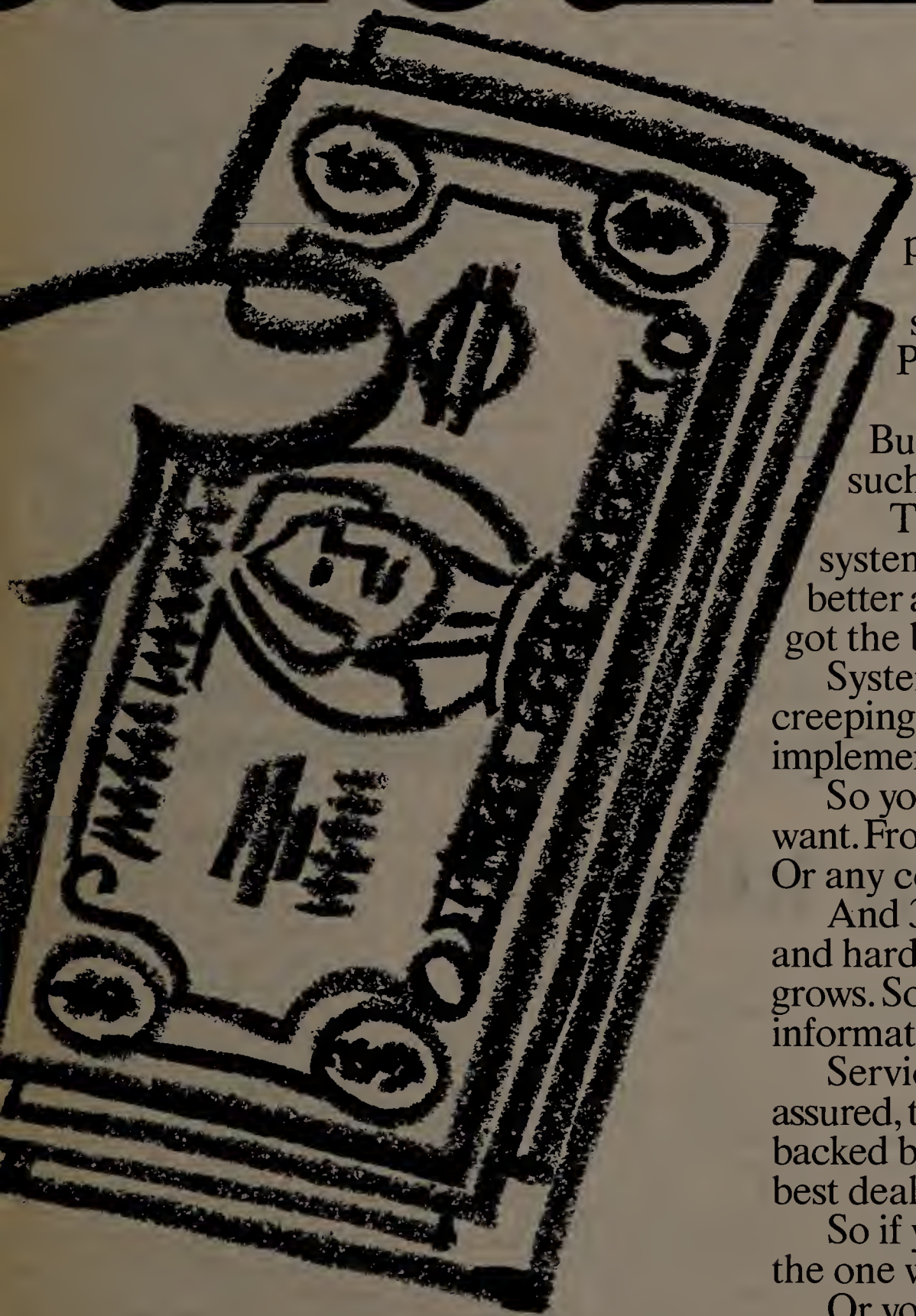
Centram's twisted-pair wired Tops LAN links up to 32 Macintoshes and Personal Computers over a distance of 2,000 feet and runs at 800K bit/sec. A Tops network software and interface board package for the Personal Computer costs \$389, and the software package placing the Macintosh on the Tops network costs \$149. ☐

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Opinions

EDITORIAL
BRUCE HOARD

New Network World section

We've made a change this week, starting on page 21. "Local Networking" has been added to our stable of news sections. The change is based on a lesson of history.

When personal computers burst upon the MIS scene at the beginning of the 1980s, they were rapidly embraced by processing-hungry end users who sought freedom from the dictatorship of the corporate mainframe.

As the number of personal computers burgeoned, more and more end-user computing was done in isolation from corporate data bases. This created a considerable amount of consternation among DP managers who saw the leverage of unified corporate data diluted and their job security threatened.

The maverick users had to be reined in. So some large companies established information centers to oversee the acquisition and use of personal computers. Others brought their purchase and control under the control of MIS. The idea was to encourage the use of personal computers for the overall good of the corporation, not just individual departments and individual users.

About the same time the personal computer was experiencing its mercurial growth in popularity, another technological phenomenon known as the local-area network was also starting to grab some attention. In the beginning, local networks were seen as marketing tools for selling workstations and peripherals. One of the foremost vendor authorities of the time referred to them as being based on "pick-and-shovel technology."

Hoard is editor of Network World.

During the early '80s, there was much vendor huffing and puffing over broadband vs. baseband and which technology would become the standard. These "Great LAN Wars" eventually subsided as users decided to make their purchasing choices based on applications, not technology.

Since then, in the fashion of personal computers, local nets have found a growing acceptance in individual departments. They have also been employed on a companywide basis. These departmental networks are frequently not hooked into corporate communications networks, a scenario that recalls the dilemma of the DP manager who sought to control stand-alone personal computer growth. Now, depending on the company, either the DP manager or the communications manager is fretting over these disparate networks, which are usually not compatible with each other, let alone the corporate net.

The pick-and-shovel technology of the earlier local nets has become more complex as competing vendors offer a plethora of wiring plans and add intelligence to their products. IBM has muddied the network waters with the introduction of its long-awaited Token-Ring Network. Fiber-optic local nets are coming into their own. There are bridges and gateways and virtual networks and file servers and twisted pairs and coax and . . .

As you can see, there are a lot of technological issues to consider. There are also management issues. How can the departmental nets be brought under the corporate umbrella? Should MIS or communications call the shots? Who should be in charge of these de-

partmental nets at the departmental level?

Currently, many would-be local net users are intimidated and put off by the prospect of networks. Many among this group are more comfortable falling back on the good old reliable corporate mainframe. Why mess around with the time and expense of a local-area network when a personal computer can be hooked up to the mainframe overnight?

The problem is, even an IBM 3090 is limited in the number of devices it can support. So, you say, throw in a mini between the micro and the mainframe. Let it weed out the work that can be done locally from the tasks that require downloading of corporate data. That's fine, if you can afford the mini and find the right software to control it.

Of course, many vendors are fanning the flames of all this confusion by proclaiming the supremacy of their own products without truly considering the needs of users. With all this in mind, *Network World* is introducing a new section — "Local networking" — in this issue. Its mandate is to address the local networking issues that concern users now. Each week, you will get boiled down, up-to-date news and opinions written to explain and enlighten. "Local Networking" replaces "Factory Communications" as our fourth news section. Rest assured, our coverage of factory issues will continue. We never would have started the section if it didn't show promise. However, the current change is based on more pressing reader needs.

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MICHAEL SCHUMER

Stalking the killer

During the past two months, the trade press has been teeming with news about 4:1 and 5:1 voice compression and the possibility of an imminent AT&T packetized voice product. Products based on these technologies would have enormous impact on both private and public network plans, architectures and costs. What is going on here?

When AT&T first discussed Universal Information Systems (UIS) in 1985, it referred to packetized voice as a "killer" technology. Although that may be true, the technology could hurt AT&T more than its competitors if it is not handled properly.

For more than a year, AT&T has been talking about UIS, which it

claims will integrate voice, text and graphics in the 1990s via packetizing. But while it was rumored that a packetized voice trial was under way, AT&T was quiet about the details.

It is not in AT&T's bottom-line interest to foster voice packetization or other techniques that reduce line requirements of its large corporate customers. Demand for additional lines and bandwidth is much lower than the rate of technological improvement in bandwidth price and performance.

Voice requirements are growing by only 5% per year, and computer communications growth is hampered by fuzzy standards and the lack of applications software. Visual communications such as video and facsimile will not grow fast enough to take up the slack between users' needs and bandwidth capacity.

Therefore, if customers can quickly take advantage of inexpensive fiber-optic transmission and

voice compression, AT&T's service revenue could drop. It is in AT&T's interest to downplay voice packetization and to position it as a next-generation, post-Integrated Services Digital Network technology.

Stratacom Systems, Inc., a start-up funded by venture capital, has jumped into the market with the IPX — a T-1 nodal processor that packetizes voice signals to yield toll-quality voice with a 4:1 reduction in bandwidth. Toll quality denotes sound that is as good as AT&T long-distance services.

Although Stratacom can boast the first commercially available voice packet switch, all major customer premises equipment suppliers are working on such technologies. GTE Laboratories recently demonstrated a nonpacketized 4:1 voice compression that is comparable in quality to 2:1 adaptive differential pulse code modulation (ADPCM). The benefit of this technology is that it can potentially reduce the cost of large T-1 networks.

Because, typically, 80% of the cost of such networks is in leased T-1 facilities, 4:1 compression can save 20% to 30% over 2:1 compression based on continuously variable slope delta and ADPCM techniques.

Packetized voice products do not exist solely at the T-1 level. T-1 multiplexers and node processors have captured the industry's attention because users understand the cost benefits of using T-1 facilities to carry large volumes of voice and data traffic.

Is there a trend out there that no one is picking up on? Write a column about it for *Network World*. Manuscripts must be letter-quality, double-spaced and approximately 800 words in length. Disk and modem submissions are preferred.

Columns should be timely, controversial, literate and technically accurate. Contact Steve Moore, features editor, *Network World*, Box 9171, 375 Cochituate Road, Framingham, Mass. 01701, or call (617) 879-0700, ext. 584.

Schumer is vice-president and director of telecommunications research advisory and strategic planning services for Gartner Group, Inc., an information industry research firm in Stamford, Conn.

Opinions

►TELETOONS — By Phil Frank

All I did was check
one little box asking
for information about
their network services.



But T-1 equipment vendors have no solutions for low-volume routes. Nor can vendors solve T-1 networking's strategic vulnerability to carrier pricing. Increasing carrier-access line costs leads to the removal of many low-volume locations and the consequent loss of traffic volume on internodal T-1 links.

Products from Republic Telcom Systems (RTS), a start-up funded by venture capital and spun out in April from reseller Republic Telcom Corp., do for low-volume locations what T-1 equipment vendors do for high-volume locations. They reduce transport costs through improved facility use and through the ability to carry voice and data traffic on the same channel. By helping to make it cost-effective for users to keep low-volume locations on their networks, RTS claims to offer the antidote to carrier pricing strategies aimed at forcing users off private networks.

RTS has developed products for analog private-line compression applications. But the products with the greatest potential are those that compress voice and allow for simultaneous digital data transport on 56K bit/sec digital lines or DS-0

64K bit/sec channels.

Using a proprietary digital-encoding technique based on taking six samples of speech 12 times per second and then sending only non-redundant bits in a packetized format, the systems can handle up to eight simultaneous, toll-quality conversations on single 56K bit/sec or DS-0 lines.

Even using AT&T's premium 56K bit/sec Dataphone Digital Service, use of these digital compression products can save customers up to 60% over the cost of voice-grade lines. Asynchronous data and 9.6K or 19.2K bit/sec synchronous transmissions can be traded off for voice channels, so voice and data sharing of facilities can be done for locations that would not come close to being able to justify a T-1 facility in terms of traffic volume.

According to Gartner Group, Inc. of Stamford, Conn., pressure from other vendors led AT&T Network Systems to reveal its alleged plan to introduce a 5:1 compressed packetized voice product or service next quarter. But although AT&T has the technical capability to intro-

See T-1 page 41

NETWORK DIRECTIONS

DAVID SINCOSKIE

Packet-switch smorgasbord

A digitized, packet-switched telephone network is coming.

This network will combine the enormous bandwidth of fiber-optic cable and the spectacular signal-processing power of very large-scale integrated (VLSI) circuits to produce a smorgasbord of services — voice, data and video — that will boggle the mind of even the most visionary telecommunications manager.

Why packet switching? In Bell Communications Research, Inc.'s (Bellcore) view of broadband communications, the principal future challenge to the telephone companies will be to transmit huge volumes of different types of information instantaneously and accurately.

Today's network was designed to provide affordable, reliable voice communications. Indeed, the name "telephone company" implies this primary service.

Bellcore's assumption for the future network is that an abundance of available channel capacity will stimulate new and highly demanding uses for the network, including data, video, telemetry and facsimile transmissions, all moving simultaneously with traditional voice traffic. To accommodate this range of demands, the network must be enormously flexible.

The packet-switched advantage

In such an environment, packet switches hold an advantage over circuit switches because of the tremendous efficiencies gained in eliminating fixed channels between transmitting and receiving points.

By shepherding bundles of information individually through the network via the most convenient path, packet switches in effect create tiny circuits that exist only for the instant they are needed. This eliminates the problem of maintaining open circuits for data and video traffic that are fully used only during sporadic bursts of high-speed transport.

While it may be a relatively new concept, bursty telephone traffic is not a new phenomenon. Voice traffic is characteristically interspersed with long silences,

Sincoskie is division manager for packet communications research at Bell Communications Research, Inc. in Morristown, N.J.

and it generally occupies only half a circuit, even during active conversation.

For years, this characteristic has been used to optimize long-distance transmission by rapidly switching, for example, 48 conversations onto a cable capable of carrying only 24. This propensity toward burstiness exists in video traffic, and is exceedingly strong for data — so strong, in fact, as to represent a qualitative change.

For circuit-switching technology, this creates a dilemma: Shall the circuit be suited to the average traffic flow but subject to delays during periods of peak activity, or should it have the capacity for maximal flow at the expense of massive inefficiencies of design?

Fortunately, packetized information does not require the network to maintain an open circuit. Each parcel of information finds its way through the network, then disappears, taking its "circuit" with it.

Channel capacity required for only a portion of a transmission is encumbered only during that portion, leaving the channel free to carry other traffic the rest of the time. The result is sharp reductions in hardware and operating costs.

Packetized data networks are already familiar. The Department of Defense Advanced Research Projects Agency's Arpanet, the first packet network to serve a large group of distributed users, is a prime example.

More recently, New England Telephone and Harvard University installed a metropolitan-area network capable of transmitting data at 10M bit/sec among the Harvard University observatory, the Aiken Computation Laboratory, Harvard Medical School and Massachusetts General Hospital.

Packet switching will become commonplace as the first generation of Integrated Services Digital Networks goes into place. ISDNs, as currently envisioned, will include 16K bit/sec packet-switch adjuncts for transmitting data and common-channel signaling.

That, however, is but a faint foreshadowing of the ultimate role of packet switching. Eventually, ISDN technology will progress toward an integrated net-

See Switching page 41

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Features

November 10, 1986



The bug stops here

Management of corporate communications departments today is no longer perceived as an overhead function. Network facility management is evolving from a cost control function into an active participant in determining the corporate bottom line. Part one of this article looks at the ins and outs of facility management for voice networks.

Page one.



Profile: Bank of Boston's John Doggett

As vice-president of telecommunications at Bank of Boston Corp., Englishman John Doggett supervises 40 employees in both voice and data applications. Although Doggett considers voice and data disciplines separate, employees from both work departments together to come up with the best approach for each project decision.

Page 39.

Is there a trend out there that no one is picking up on? Write a column about it for *Network World*. Manuscripts must be letter-quality, double-spaced and approximately 800 words in length. Disk and modem submissions are preferred.

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FEATURE FOCUS

The bug stops here

Continued from page 1

mission lines and assuring the quality and availability of these lines — is a major time taker and expense item.

The categories of information needed for transmission facility management include:

- Facility use information for continuing network optimization.
- Facility availability information for vendor control and comparison.
- Transmission and signaling quality information for vendor control and comparison.
- Fault segregation between lines, switches and other network components for vendor management or repair of owned facilities.

These management information needs apply to both voice and data lines and to both analog and digital systems. The actual parameters and measurements are different for voice and data transport and analog and digital transport facilities, so the instruments are different. However, the conceptual framework outlined above is still applicable when designing a strategy for keeping any transport system operative in the face of less than reliable lines.

The table on Page 38 shows the principal sources of data needed in each of the above information categories to manage lines with voice

signals and voice-band modem signals.

Usage information

Facility usage information consists of all sources of data to answer the following questions:

- Are the facilities in the network being used properly?
- Are the proper number and types of facilities in place to optimize the intended cost vs. capacity trade-off?

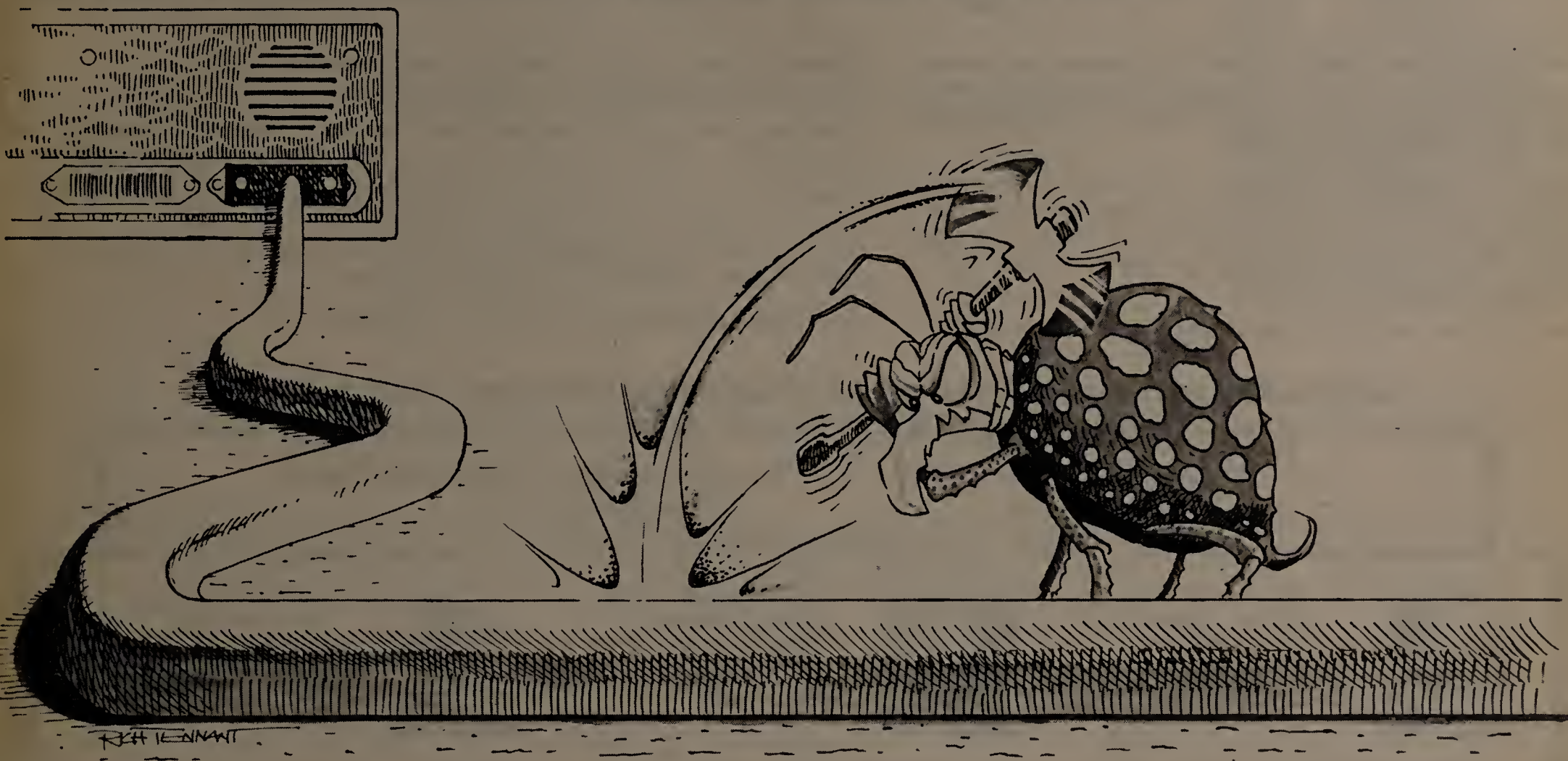
One difficulty in network design and optimization is that the observable traffic patterns are a function of the size, ease of use and quality of the network currently in place. The traffic that would exist in a perfect network is hard to measure; the "answer" (the current network) affects the "question" (what traffic would be supported ideally). The data sources listed in the table help to solve this problem.

Information desired includes total traffic per trunk, data traffic per trunk (because data and voice holding times are very different and a separate network may be needed for data users), traffic per trunk group, call holding time averages, incoming vs. outgoing traffic, all trunks busy percentages and peg counts (number of calls) per trunk.

The first information source is user complaints of blocking. This is a slow and imprecise source of data and would be suitable only in an environment of absolute cost minimization.

A well-designed process of manual usage monitoring is effective at

O'Neill is president of OneCom, Inc., a Boulder, Colo.-based supplier of transmission facility management systems.



RICH TENNANT

small sites served by key systems or small private branch exchanges with direct trunk appearance at the console. If attempted over a long period without continuing management involvement, the accuracy gradually decreases. In large networks, manual monitoring proves difficult; choosing when to monitor and for how long are hard decisions without help from other data sources.

Information relating to trunk groups can be derived from modern switches via station message detail recording information processing for traffic totals or via the facility management systems associated with some PBX systems.

Drawing conclusions about call blocking and traffic distribution among individual trunks from trunk group data is not easy. If

The traffic that would exist in a perfect network is hard to measure.

blocking is low and the trunks are all working properly, conclusions can be drawn. The problem in many traffic distribution problem situations is that the trunk selection is not properly programmed in the PBX. Using the PBX information to

try to solve the same problem makes a manager's life unduly frustrating.

Facility-monitoring products are available that are designed specifically to gather, record and report to the central management node the types of usage information needed for optimization. These include traffic-only monitor systems and the newer combined traffic and transmission quality monitor systems, such as NetWatch from One-Com, Inc. of Boulder, Colo.

These "active monitor" systems can distinguish voice and data traffic, report each separately and report on the transmission quality of the facilities. They can also be trained to monitor for exception conditions. In this mode, the system does not require periodic attention; it calls the manager when a parameter is out of limits.

Both the traffic-only and active monitors are nonintrusive; that is, they are invisible to the network and easy to use. This allows their use as built-in systems or portable instruments.

Facility availability

Facility availability information determines when and for what percentage of the time each transmission facility is not working at all and when it is not in specification.

Several methods are available to make these determinations. Manual observation is applicable at smaller sites if the serving trunks appear directly on a key system or PBX console. In larger PBXs, facility diagnostics are emitted from the

maintenance port. These serve to tag totally dead lines, but the facility-related messages tend to get lost in an information pollution effect. In other words, managers are overwhelmed with too much data coming out of the ports.

Traffic-only monitors can contribute timely and relatively precise availability information provided the facility fault manifests itself as a recognizable DC signaling state. As for the harder question of whether the trunk is available within specification, the answer must come from the active monitor system or directly from an intelligent transmission terminal device, such as a microwave terminal or digital terminal with strong diagnostic output. This is available only if the facility terminal equipment is owned by the network or if a special arrangement has been made with the carrier.

Tone routining does not appear under facility availability in the table, but it could play a role if the routining were done on an ongoing basis. This is not how tone-routining systems are normally used, however. These automated testers are usually programmed to make a test call, usually through the PBX test port, on each accessible trunk during off-traffic hours, so that users' calls during business hours are not blocked because trunks have been seized for test calls.

During such calls, the tone-routining system transmits tone and silence in each direction to characterize the gain vs. frequency, echo

See Bug page 38

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Leader: Harold C. Folts,
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T-2 ISDN—Status and Developments

Leaders: James G. Herman, Director,
and Mary A. Johnston, Senior
Consultant, Telecommunications
Consulting Group,
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In this tutorial you'll learn what ISDN will and won't deliver in the late 1980s, what the emerging ISDN standards will mean in terms of new services and improved network performance, what holes still exist in the standards and trials, how to make smart buying decisions while keeping open your options for ISDN compatibility, and more. *Level: Intermediate.*



T-3 Strategic Planning for Corporate Information Networks

Leader: Dr. Howard Frank,
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Leader: Dr. John M. McQuillan,
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T-6 Designing Voice and Data Networks Under the New Tariffs

Leader: Robert L. Ellis,
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Take this tutorial to learn the structure of the post-divestiture tariffs, the latest January 1987 changes to these tariffs, how to price interstate private lines, how to configure and price interstate FX services, the new economics involved in configuring data networks, the LATA-pure strategy, and more. *Level: Intermediate.*



T-7 Managing the Telecommunications Resource

Leader: Gerald P. Ryan,
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This one-day course briefs you on how to develop a successful management environment. You'll learn what tools are available to do your job more professionally, how to plan a network management center, how to staff and train the department, and how to prepare and substantiate departmental budgets. *Level: Intermediate.*



T-8 IBM Token-Ring Versus Other LAN Choices

Leader: Dr. Kenneth J. Thurber,
President, Architecture
Technology Inc.

This tutorial gives you an across-the-board overview of announced products, future plans, compatible products, and IBM's overall strategy with respect to Token-Ring technology. You'll discuss the Token-Ring's relationship to IEEE 802.5, the IBM cabling systems and hosts, get an in-depth look at NETBIOS and APPC/LU 6.2 interfaces, and more. *Level: Intermediate.*



T-9 VSAT Technology and Implementation

Leader: Dr. Jerome G. Lucas,
President, TeleStrategies

Learn the basics of applying very small aperture terminal (VSAT) satellite communications to your networking needs. You'll get acquainted with basic application requirements in SNA networking, data broadcasting, PC networking, video broadcasting, and teleconferencing. *Level: Intermediate.*



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Leader: Daniel Zatyko,
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T-11 An Introduction to Data Communications Today

Leader: Gary Audin,
President, Delphi Inc.

This course introduces you to the basic concepts, terminology and technology of data communications. You'll learn how various networks operate and how to select them; how best to interconnect computers, terminals, and PCs using different protocols; and what software is necessary to support protocols and network management. *Level: Introductory.*



T-12 Understanding the Communications Regulatory Environment

Leader: Richard E. Wiley,
Senior Partner,
Wiley, Rein & Fielding

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Bug from page 35
and noise of each line that can be accessed by the routiner. Because most tone-routining systems can also be manually set by the operator to test individual lines, they are also called tone testers.

Quality counts

The third class of information needed for transmission facility management — quality information — pertains to the quality of the lines that meet the availability criteria — the working lines. The questions to be answered are:

- What is the level of transmission quality and signaling accuracy on each of the facilities in service?
- Which vendors are providing good quality lines?

- Which lines are showing incipient problems that are not sufficiently bad to cause user complaints?

The tools and methods to answer these issues include several mentioned above. Manual routining should be performed before the workday begins if automated systems are not available.

An automated tone-routining system will perform the same task more accurately and without skipping a morning if the attendant arrives late. But it also suffers the inability to find traffic-sensitive problems or problems that occur after the assigned routining time and before the next assigned time.

The active monitor system solves these difficulties in that it uses the actual traffic on the

**Voice network manager's
information needs and data sources**

Information needs	← Imprecise, slow Precise, fast →			
	User complaints	Manual monitoring	Traffic data from PBX	Facility monitor
Facility usage				
Facility availability	Manual observing	Facility diagnostics from PBX	Facility monitor	Transmission terminal diagnostics
Transmission quality	Manual routining	Tone routiner	Facility monitor	Combined facility monitor and tone tester
Fault segregation	Facility monitor	Metallic access tone tester	Combined facility monitor and tone tester	
	Tone tester			

SOURCE: ONECOM, INC., BOULDER, COLO.

trunks as input data and can provide accurate, timely information

on changes in line performance. But it can play only an incidental role in detailed debugging; that is, it can report on a received tone but cannot send a test tone. Therefore, a tone-routining system may be a better investment if the facilities are owned than if they are leased from the carriers or the local operating company.

Another tool that would be effective for gathering precise and timely facility quality information is a combined active monitor and tone tester. This hybrid would be able to isolate a suspect facility by monitoring continuously, then performing a detailed test in traffic. However, this system is currently not available from any vendor.

Finding fault


Fault segregation information is a difficult and important issue to solve. The question here is whether the known transmission or signaling problem is due to a faulty line or to faulty switch action.

Fault segregation tools include the active monitor system and the PBX-related tone test system. Neither effectively segregates level or signaling problems between the PBX port and the line. If the manager knows that the PBX port was not changed at or near the time when the fault appeared, it is reasonable to blame the line and call that vendor first because transmission facilities have a higher failure rate than PBX ports.

A stronger tool is a tone tester/routiner system that accesses the facilities directly via metallic contacts rather than a test port on the switch. Because the line and PBX are disconnected to make the test, fault segregation is stronger. The drawback to this approach is its higher cost and greater intrusiveness. In metallic access tone systems, a system failure can affect service on the network if the failure occurs in the metallic contacts or in the cabling to or from the routiner system. The ultimate tool for fault segregation between the switch and line is the nonexistent combined active monitor/tone tester system. Because this system would have an appearance on both the station side and trunk side of the PBX, it could accurately verify the transmission properties of the PBX at any time, on any line.□

Next week, part two will discuss transmission facility management from the data networking side.

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NETWORK WORLD

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BY PAUL KORZENIOWSKI
Senior Editor

BOSTON — When John Doggett speaks, people can't help but listen.

In a city where the expression "Pahk the cah in Hahvard yahd" easily identifies the locals, Doggett is an aberration. Though he has lived in Boston for more than 10 years, Doggett has yet to lose the accent he carried from his home town of London.

From his office on the 25th floor of a downtown high-rise, Doggett overlooks the ocean he crossed 10 years ago from merry old England to join Bank of Boston Corp.

As the bank's vice-president of telecommunications, Doggett supervises 40 employees involved with both voice and data applications. His staff's responsibilities range from maintaining the company's private branch exchange to recommending how a data base should be designed.

While the bank's personnel for both voice and data communications report to one manager at the corporate level, clear boundaries

► PROFILE

Bank of Boston's John Doggett

still separate the two disciplines.

Doggett does not think employees should be fluent in both voice and data. "An employee can put on a voice and data hat, but underneath the hat is either a voice person or a data person," he says.

When making a recommendation, Doggett says, the data person would typically lean to a data approach and the voice person would usually opt for a voice solution. By keeping the disciplines separate, Doggett helps to ensure that both approaches are adequately represented before any decision is reached.


Typically, Doggett assigns a voice analyst and a data analyst to a project. Both analysts are famil-

iar enough with the two disciplines to debate the merits of different approaches.

Doggett prefers that differences be resolved before a recommendation reaches his desk. In rare cases when the two sides cannot reach an accord, he casts the deciding vote.

Once a decision is reached, both parties are expected to back it. "When we make a recommendation to our users, we want to present a unified front," he says.

Doggett says finding qualified personnel to present either voice or data concerns is very difficult. For the voice side of his house, Doggett takes entry-level employees and gradually gives them more respon-

 See Doggett page 40

Doggett from page 39

sibilities. "A voice employee may start off with simple items, such as moving telephone extensions," he explains.

Employees are encouraged to attend training classes to broaden their expertise.

Data communications personnel are more difficult to find and train. One reason is that Doggett's group does not handle a large volume of data applications. Because Bank of Boston operates in a decentralized manner, much of the responsibility for data communications is handled by various Bank of Boston data centers.

Doggett has only a handful of data communications employees on his staff. He says that to design a

data communications network, an employee would have to have five to 10 years of hands-on experience. Rather than trying to keep a large stable of these workers, Doggett often goes outside the bank when faced with a complex design question. Two sources supply him with a great deal of help.

The first source is consultants. "We may have someone on our staff familiar with fiber, but it does not make sense for us to maintain a fiber expert," he says. Such an expert would only be needed for special problems and would command a substantial paycheck.

Rather than signing that paycheck on a regular basis, Doggett calls upon consultants on an ad hoc basis. "Consultants are not hard to find," he says. "We are inundated with mail from them every day.

"Fast workers who consistently produce quality work can be hard to find," Doggett adds. "We've discovered that the best way to find out how well a person works is to assign him a project and see how it comes out."

Doggett has been using consultants for more than 10 years and doesn't recall one bad experience, but he admits that the quality of the work done by some consultants was better than that done by others.

Vendors are a second source of outside help. "Manufacturers possess a great deal of expertise, although that expertise may be limited to their product lines," he says. "We've found that a sign of a good vendor is the ability to supply us with that expertise."

While consultants can supply technical expertise, they can't help a manager understand his company's business. Currently, Doggett says, the major challenge for telecommunications managers is learning how their businesses operate.

He adds that communications managers are no longer able to hide in a wire closet with a pair of pliers. "A telecommunications manager's job is not just to provide the best bang for the buck," he observes. "He has to add value to the business. That's an area we are just beginning to explore."

Doggett aims to add value to the Bank of Boston by developing strategic networking applications, but he understandably declines to reveal them. He observes, however, that many companies are not structured to ensure high productivity from their management teams as strategic applications evolve and the lines dividing voice and data functions blur.

"Very few companies have the skills on board to manage these types of applications because the issues they raise have just started to surface," Doggett says. "We are all busily trying to acquire a new set of skills."

With Doggett's guidance, Bank of Boston has taken two steps toward acquiring the proper mix of skills.

Last fall, the bank installed a T-1 backbone network, called Firstnet, and linked its Boston and Springfield, Mass., offices. "The network has already become a significant

asset to the corporation," he says. "It enables users to easily and inexpensively add or move data circuits."

For example, the backbone network helped Doggett's group respond quickly to one request. Typically, the installation of a data line requires three to six months. However, shortly after the T-1 network was up and running, the bank faced an emergency: A link was needed from Boston to the New York office. "We were able to install a line in a week," he says.

The network was designed to help the bank compete in the new, deregulated environment. Banks, once considered stodgy, have recently become aggressive as merger and acquisition fever has gripped the industry.

Two years ago, the Bank of Boston saw this change coming and designed the network with an eye toward the future. A two-year-old diagram that Doggett uses to illustrate the network lists a data center in New Hampshire, even though Bank of Boston does not yet have any banks there. Obviously, the bank plans to expand its network.

Network expansion

Some of the expansion will be the result of existing needs. Since the network was installed last fall, nodes have been added for Bank of Boston data centers in New York and Dorchester, Mass. Other additions are expected to come through acquisition.

Moving aggressively in its attempt to become the premier New England bank, Bank of Boston has purchased Casco Northern Corp. in Maine, Rhode Island Hospital Trust, Inc. and Colonial Bancorp, Inc. in Connecticut. Doggett says the bank has just begun to examine how to integrate these networks with Firstnet.

The importance of telecommunications within the Bank of Boston can be seen in the way Firstnet was designed. A representative from Doggett's group chaired the committee that decided how the company should proceed. It also mediated any disputes that arose.

The network is the second step in the management plan. Before Doggett arrived, the bank had moved its voice operations from General Administration under the MIS umbrella. However, voice and data communications functions were overseen by different managers.

Five years ago, Doggett was given the responsibility of managing the two communications disciplines and merging functions wherever appropriate. He decided that the bank could leverage its mammoth voice requirements and benefit data users with the gains: lower bills, more flexibility and better responsiveness.

Bank of Boston's downtown office buildings had been working with Centrex services. By migrating to an integrated voice and data PBX, Doggett knew the bank could save money and supply data users with the three benefits mentioned above.

When the evaluation was com-

pleted, Northern Telecom, Inc. was aggressively pursuing the high-end PBX market, and Bank of Boston deemed Northern Telecom's SL-100 the best product available on the market.

However, its installation was not without problems. For a time, users longed for their Centrex services, while the bank and Northern Telecom worked to get the bugs out of the system.

Now, says Doggett, the switch is "the crown jewel of our company's network." Some data is run through the switch, but it is primarily used for voice traffic.

While the continuing challenges of his job are keeping Doggett in Boston, it was his wife who initially brought him here.

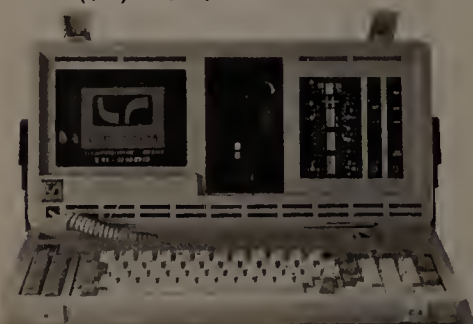
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1 My primary areas of activity. Circle ONE only.

I am involved in evaluating communications (data, voice and /or image) products and services:

1. for use within my own company/organization
2. for resale to other companies/organizations
3. Both

la For communications, my primary responsibility is: Circle ONE only.

1. Data Communications
2. Voice Communications
3. Both

2 Circle only the ONE title classification which most applies to you.

Company Management

11. Chairman, Pres., Owner, Gen. Mgr., Partner, Director, CIO, VP, Dir. Head of Finance, Admin. Procurement

Communications Management

Data Communications

21. Management
VP, Dir., Mgr., Head, Chief: Data Communications, including Networks, Engineering, Design, R&D, Application Development
22. Supervisory/Staff
Supervisor, Head: Networking, Design, Analysis, Engineering, R&D, Applications, Services

Telecommunications

31. Management
VP, Dir., Mgr., Head, Chief: Telecomm., Voice Comm., including Networks, Engineering, Design, R&D, Application Development
32. Supervisory/Staff
Supervisor, Head: Networks, Design, Analysis, Engineering, R&D, Applications Services

Factory Communications

41. Management
42. Supervisory/Staff

MIS/Data Processing

51. Management
VP, Dir., Mgr., Head, Chief: MIS/DP, Systems Application Development, Operations, Office Automation
52. Supervisory/Staff: Supervisor, Head of System Design, Analysis, Applications

Others

75. Consultant
80. Educator
85. Financial Analyst
90. Marketing/Sales
95. Other _____

3 Job Function

Which one of the following best describes your functional involvement with communications (data, voice, and/or video) products? Circle ONE only.

Corporate

1. Business Management, Planning and/or Development

Communications System/Network

2. Management, Planning and/or Development
3. Implementation and/or Operation
4. Other _____

4

Which one of the following best describes the primary business activity of your organization at this location? Circle ONE only.

Consultants

11. DP/Communications Consulting Services
12. Consulting Services (except DP/Communications)

End Users

13. Manufacturer (other than computer/communications)
22. Finance/Banking/Insurance/Real Estate
23. Education
24. Medicine/Law
25. Wholesale/Retail Trade
26. Public Utility/Transportation
27. Mining/Construction/Petroleum Refining/Agriculture/Forestry
28. Business Services (excluding DP/Communications)
29. Government: Federal
30. Government: State/Local

Vendors

41. Carrier: including AT&T, BOCs, Independent Telcos, Public Data Networks, Intern'l Records Carriers
42. Interconnect
43. Manufacturer Computer/Communications Equipment
44. Value Added Reseller (VAR), Systems House, Systems Integrator
45. Distributor
46. DP/Communications Services (excluding consulting)
95. Other _____

5

In which ways do you typically become involved in acquiring communications products (data, voice, and/or video) and services? Circle ALL that apply.

1. Recommend/Specify
2. Identify/Evaluate Potential Vendors
3. Approve the Acquisition
4. None of the Above

6

Check ALL that apply in columns A and B.

A. I am personally involved in the acquisition process (specification, selection, approval) for the following products and services:

B. These products and services are presently in use at this location:

A	B	Product/Services	A	B	Product/Services
Computers			Transmission/Network Services Equipment		
01.	<input type="checkbox"/>	Micros	18.	<input type="checkbox"/>	Microwave
02.	<input type="checkbox"/>	Minis	19.	<input type="checkbox"/>	Satellite Earth Stations
03.	<input type="checkbox"/>	Mainframes	20.	<input type="checkbox"/>	Local Area Networks
Data Communications			21.	<input type="checkbox"/>	Wide Area Networks
04.	<input type="checkbox"/>	Communications Processors	22.	<input type="checkbox"/>	Packet Switching Equipment
05.	<input type="checkbox"/>	Comm./Networks Software	23.	<input type="checkbox"/>	Fiber Optic Equipment
06.	<input type="checkbox"/>	Digital Switching Equipment	Communications Services		
07.	<input type="checkbox"/>	Facsimile	24.	<input type="checkbox"/>	Packet Switching Services
08.	<input type="checkbox"/>	Modems	25.	<input type="checkbox"/>	Cellular Mobile Radio Services
09.	<input type="checkbox"/>	Multiplexers	26.	<input type="checkbox"/>	Electronic Mail
10.	<input type="checkbox"/>	Protocol Converters	27.	<input type="checkbox"/>	Enhanced Services
11.	<input type="checkbox"/>	Network Mgmt. & Control	28.	<input type="checkbox"/>	Centrex
12.	<input type="checkbox"/>	Test Equipment	Telecommunications		
13.	<input type="checkbox"/>	3270 Controllers	14.	<input type="checkbox"/>	PBXs
Telecommunications			15.	<input type="checkbox"/>	Key Systems
14.	<input type="checkbox"/>	PBXs	16.	<input type="checkbox"/>	Central Office Equipment
15.	<input type="checkbox"/>	Key Systems	17.	<input type="checkbox"/>	Integrated Voice/Data Terminals
16.	<input type="checkbox"/>	Central Office Equipment	Estimated value of communications systems, equipment and services:		
17.	<input type="checkbox"/>	Integrated Voice/Data Terminals	A. which you helped specify, recommend or approve in <u>last 12 months</u> ?		

7

Estimated value of communications systems, equipment and services:

A. which you helped specify, recommend or approve in last 12 months?

Check only ONE in column A.

B. which you plan to specify, recommend or approve in next 12 months?

Check only ONE in column B.

A	B	A	B
1.	<input type="checkbox"/>	6.	<input type="checkbox"/>
2.	<input type="checkbox"/>	7.	<input type="checkbox"/>
3.	<input type="checkbox"/>	8.	<input type="checkbox"/>
4.	<input type="checkbox"/>	9.	<input type="checkbox"/>
5.	<input type="checkbox"/>		

8

Estimated gross annual revenues for your entire company/institution:

Circle only ONE.

1. Over \$1 billion
2. \$100 million to \$1 billion
3. \$5 million to \$100 million
4. Under \$5 million

9

Estimated number of total employees at this location:

Circle only ONE.

1. Over 5,000
2. 1,000-4,999
3. 500-999
4. 250-499
5. 100-249
6. 50-99
7. 20-49
8. 1-19

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- ☐ New subscription request.

THANK YOU.

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▲

Doggett from page 40

He was a software engineer at a London company when his wife, a physician, was given the opportunity to train for a year at Boston's Children's Hospital.

The Doggetts found Boston quite comfortable, and after the year was up, his wife put in for an extension. One extension followed another until the couple decided that their temporary living situation would become permanent, and they would stay on the American side of the Atlantic.

Even though his own British accent remains as a reminder of the country he left behind, Doggett notes with a smile that his children speak with a distinct Boston dialect. ▮

T-1 from page 31

duce packetized voice products, it is unlikely to do so in the near future.

First, packetized voice switches would conflict with AT&T Communications, Inc.'s strategy to undermine private voice networks and to migrate major customers to its Software Defined Networks. It would also prematurely abbreviate the life cycle of its System 75 and System 85 private branch exchanges, as well as its 5ESS central office switch.

AT&T won't lead

Furthermore, quick introduction of this packetized architecture will surely incense the regional Bell operating companies, which are being led down the ISDN path by AT&T. It is clearly not in AT&T's strategic interest to lead the market with this new technology.

Because overall demand for bandwidth probably will not grow significantly in the near future, the net result of widespread voice packetization would be an AT&T revenue loss.

Although AT&T's recent demonstration of its packetized voice technology is not a surprise to industry watchers, the statement by Richard Snowden, AT&T director of service conception, makes AT&T's position quite apparent: "There are no specific plans for use of the technology."

Integrating packetized voice

Packetized voice integrated with data and image will be an important element of private, and ultimately public, networks in the mid-to late 1990s. But because of its vested interest in selling and providing service via earlier technologies, AT&T will follow the market rather than lead it.

Other vendors without such vested interests, including Northern Telecom, Inc., GTE Telenet Communications Corp., IBM and NEC Corp., are more likely to be the leaders.

For those who maintain control of their own networks, there will likely be new opportunities for private network optimization. For resellers, other common carriers and perhaps even public packet networks, it will mean a chance for them to compete more effectively for public-domain voice services. ▮

Switching from page 31

work providing integrated services. All traffic will be processed through a single type of switching fabric.

In the view of the Packet Communications Research Group at Bellcore, that fabric will be of the packet-switching type.

The popular perception of packet switching has been that it is good for transmitting bursty traffic, such as data, but that it is of doubtful value for voice and video. The belief is that, if the system can tolerate delays, then a packet switch is a good choice; if not, then it's not. However, this view is mistaken.

For example, a few days ago, I was writing an article on my terminal, which is connected to a packet voice telephone. The phone rang, and my terminal printed: "Call from Dan." I had a deadline, so I didn't answer the call.

As I completed the article, the phone rang again, and the terminal printed: "Call from Sue." I answered the phone, and my secretary said "Dave, your new office is ready, and you've got to move right away."

The quality of the call was nearly perfect, since Bellcore's packet

network is completely digital. I hung up, logged off the computer and disconnected the phone from the wall. Then I tucked it and the computer terminal under my arm and walked down the hall to my new office. Upon arriving, I plugged my packet phone into the wall, logged back onto the computer and started reading my electronic mail and answering phone calls.

The experimental packet-switching network, installed at Bellcore's research facility in Morristown, N.J., has the ability to route packets to their destinations, even if those destinations move.

My telephone number is permanent, which means it doesn't require any wires to be moved, switches to be reprogrammed or data bases to be changed. The network learns my new location and automatically reroutes any packets addressed to me the moment I reconnect my phone and transmit a packet.

This concept, if extended to a national network, would allow users on business trips to receive calls — voice, data or video — dialed to their personal numbers, in cars, planes or at hotels. It also has enormous possibilities for reducing the

costs associated with providing these services.

There is much to be done before all of the above services become commonplace, not the least of which is the development of a truly high-capacity packet switch. Current packet switches, such as those used in the Arpanet, have a capacity of about 1,000 packets per second, or roughly 1M bit/sec.

Bellcore says that it is feasible to construct a packet switch that is a million times faster than that, or about 1-trillion bit/sec.

Right now, Bellcore is working on a packet switch that will have a throughput of 10-billion bit/sec. That's enough to supply voice switching to two million people or high-speed video services to a few hundred homes.

What is astonishing is that the packet-switching fabric will be composed of about 500 VLSI chips, and will fit into a space of roughly 2 cubic feet. Some of the chips already have been tested.

Many years of research and development still must be done on a broadband packet network. But data networks already in place will continue to grow in capability and complexity. ▮

► TRANSMISSION ALTERNATIVES

User sets pilot test for AT&T Skynet

BY MARGIE SEMILOF

Senior Writer

PARK RIDGE, Ill. — The American Farm Bureau Federation announced last week it will conduct an 11-site pilot test of an AT&T Skynet very small aperture terminal network supporting two-way data and video communications. The network could eventually widen to embrace 500 sites in a contract worth \$15 million.

The federation, an organization representing independent farmers, plans to link 50 state farm bureaus, including one located in Puerto Rico, according to S. Kim Wells, general manager of American Agricultural Communications Systems, an American Farm Bureau Federation affiliate.

The organization will begin its 90-day test of AT&T's Skynet VSAT service in January by installing a 1.8-meter dish at its headquarters here. Similar satellite facilities will be installed at state farm bureaus in Manhattan, Kan., and Waco, Texas. Additional VSATs will be placed at eight county farm bureau locations in Kansas and Texas.

The organization's contract requires AT&T to meet a number of established criteria during the pilot test, including maintaining a high level of network uptime and rapid service response time.

The federation will also be evaluating Skynet's ability to connect to a variety of mostly IBM devices and its ability to demonstrate simultaneous distribution of two-way video and data.

According to Wells, about 500

farm bureaus must use the satellite network for the federation to cover its project costs. The 50 state bureaus are already scheduled to be linked via Skynet, and their facilities will be paid for by the federation. Therefore, the organization must convince at least 450 county farm bureaus to purchase the VSAT dishes at a cost of \$15,000 each.

If Skynet meets the federation's quality requirements, a 6.2-meter dish will be installed at the hub site here. During the pilot program, however, the federation will share AT&T's New York hub facilities.

The organization currently uses a dial-up electronic mail system to link all state farm bureau offices to the home office here and to its Washington, D.C. bureau.

"Until last year, the home office used to call each state farm bureau every 30 minutes to retrieve messages," Wells said. "Those messages were then shuttled via E-mail to various states. This year all incoming traffic is handled by 800 WATS service. We only call farm bureaus when we have a message to deliver."

Wells said he expects the amount of savings using Skynet over terrestrial links will vary for each location. He said the average monthly cost for each state's phone service is between \$180 per drop and \$580 per drop. "We expect the VSAT network will cost about \$300 per location."

The increasing cost of terrestrial communications links and the desire to run more applications over a single medium were key factors in the decision to switch from phone

service to satellite service, Wells said.

One of the network's primary functions will be to provide two-way video services for teleconferencing and for the transmission of live legislative activity.

In the past, the federation purchased satellite time and produced its own programs. Farm bureau members had to find local satellite facilities, either in hotels or hospitals, to view the federation programming.

"With our own system, we can broadcast at any time," Wells said. Wells said the federation also plans to use Skynet to transmit its market information data base service to farmers who use their own personal computers.

The farmers currently make long-distance calls to state bureaus to access information services. "The VSAT network will make it possible for farmers to get that information by making a local call to a county farm bureau office," Wells said.

Wells said Skynet will also provide a two-way data link between bureaus, which frequently send insurance policy information back and forth.

"State offices are currently using the terrestrial network to access farm bureau insurance records," Wells said. "That's a lot of money that could be spent on the VSAT network."

The federation considered other satellite service options, including an Equatorial Communications Co. one-way satellite network and a one-way C-band system for both voice and data. ▮

Avanti from page 4

and Customer Controlled Reconfiguration.

For example, an Avanti customer can set up a point-to-point connection between New York and Chicago. At a central office between the two sites, some channels may drop off to public services, such as Megacom. Other channels, such as digital lines, may be added to the line and passed to the end of the line.

Compatible with AT&T services

The enhancements also help to ensure that the Ultramux will be compatible with emerging AT&T services, such as subrate multiplexing and extended super framing (ESF). Subrate multiplexing will enable a customer to dedicate portions of a digital line to low-speed channels, such as 9.6K bit/sec. ESF will supply customers with additional network management capabilities.

The Ultramux' flexibility has enabled Avanti to carve out a sizable portion of the T-1 market. In 1985, the company garnered 10% of the market, approximately \$10 million, according to International Data Corp., a Framingham, Mass., market research firm. That figure includes sales made by Codex Corp., which is an Ultramux OEM. Avanti customers include AT&T, Citicorp, General Electric Co. and Shell Oil Co.

Tim Zerbiec, vice-president at Vertical Systems, Inc., a consulting firm based in Dedham, Mass., said that two product limitations prevent the Ultramux from being considered one of the premier T-1 multiplexers. First, the Ultramux's network management system is not robust. Second, the device is unable to support large networks because the Ultramux can only handle 10 T-1 lines.

Earlier this year, Avanti announced Special Access Management System, a network management package. This package has been shipped to half a dozen customers. The package's network management capabilities are limited to online terminal access. The package lacks the ability to capture and retain data for future analysis and report generation.

Al Lucci, president of Avanti, said the company plans to announce its next generation of multiplexers in January. The new product will handle additional T-1 lines and be backward-compatible with the Ultramux.

Gerald Mayfield, vice-president at the Stamford, Conn., office of DMW Group, Inc., expressed doubts that Avanti would be able to achieve both objectives. He explained that clocking problems emerge when multiplexers with byte-interleaving techniques attempt to support more than a few T-1 lines. □

3000 from page 6

Rossi Consulting, Inc., based in Marblehead, Mass. The others are Digital Equipment Corp., IBM, Wang Laboratories, Inc. and DG.

HP's office software is generally considered to be as good as that of the company's competitors, according to Joel Levy, vice-president at Wohl Associates, Inc., a Bala-Cynwyd, Pa., consulting firm. Analysts agree, however, that HP has not done well in marketing its products. Consequently, the company's office software sales come mainly from existing customers.

"One doesn't see HP bumping heads with Wang very often," said Lee Doyle, senior analyst at Inter-

national Data Corp., a market research firm in Framingham, Mass.

HP's unfocused marketing approach was illustrated in last week's DISOSS-compatibility announcement. In January, the company issued a statement of direction saying it would soon offer DISOSS support. After the statement was released, vendors such as Wang Laboratories, Inc., DG and Burroughs Corp. upstaged HP and unveiled their DISOSS offerings.

Analysts agreed that the company would have garnered a lot of positive publicity if it quickly delivered on its promises. Now, however, HP appears to be playing catch-up with its competitors. □

Diskless from page 2

one server as a central processor, Local Area VAXcluster helps to ensure that users are working with the latest version of a file because the latest version is stored on the central node. The product also enables a network manager to download files to a number of users easily.

Clusters create problems

A DEC user who asked not to be identified said clusters often are difficult to implement, and they create, rather than solve, network management problems. He added that Local Area VAXcluster works only with DEC's VMS operating system and does not support other operating systems, such as Unix, used on DEC systems. A DEC spokesman said the company plans to enhance the product so it works with other operating systems.

The prices for Local Area VAXcluster range from \$1,000 on the VAXstation to \$9,500 on the VAX 8800.

DEC also unveiled three new MicroVAX II models, one of them a diskless offering, and two diskless VAXstation II processors. The diskless processors are intended to compete against similar products from

Apollo Computer, Inc. and Sun Microsystems, Inc.

Diskless workstations offer users two benefits. Because the devices do not include floppy or hard disk drives, they cost less than comparable systems. They also offer greater centralized network control.

Administrative problems eased

Because diskless workstation users cannot store files locally, the administrative problems associated with local-area networks often disappear.

The diskless VAXstation II/GPX systems include a MicroVAX II processor, provide either a 4-plane or 8-plane color graphics processor and include 5M bytes of memory, VMS operating system, Ethernet controller and 19-inch color monitor. They are priced between \$19,900 and \$23,900.

The MicroVAX II systems include a tapeless model priced at \$19,900, a diskless computer server with 16M bytes of memory priced at \$24,400, and a Local Area VAXcluster server with VMS, DECnet or Ethernet and the cluster software for \$94,855.

All the systems are available now. □

Rolm from page 2

side," he said.

The sales practice, coupled with other by-products of the acquisition, has lowered morale, some insiders say. "IBM's treatment of the situation has been an agonizing, gradual encroachment," a former Rolm employee said. "IBM could have gone in and done everything immediately, which would have been painful, but the company would have been through it. Gradual encroachment is a natural event, but prolongs the agony."

The Rolm spokeswoman denied morale was a problem, adding that morale is "a subjective issue."

It is one of many issues Allen J. Krowe will have to address. Krowe was recently named an IBM corporate executive in charge of worldwide development and U.S. manufacturing for the Information Systems and Communications Group, the Information Systems and Products Group and Rolm.

"Krowe is a smart guy," said one former employee. "He may sense that IBM needs to get the rest of the

job done and really incorporate Rolm into the company."

Since the acquisition of Rolm by IBM, many of the top guns have left, including Ken Oshman, who was president; Richard Moley, who served as vice-president and general manager of Rolm's International Group and vice-president of marketing; and other middle-level managers. "The majority of the old pros aren't there any more," said John Powers, president of Powers Tritsch & Associates, Inc., a consulting company in Wellesley Hills, Mass.

Although regrettable, upheaval is a necessary result of corporate mergers. But even Rolm employees praised IBM's management of the acquisition.

"IBM could get into textbooks about how to handle a merger without suppressing a corporate culture," the former national sales representative said.

Misgivings are tough to avoid. "Some Rolm people haven't accepted that they are part of IBM now," another former employee said. □

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Air Force from page 1

In addition to campuswide electronic mail, the network will also support videotaped classroom instruction, available through video monitors, laser printer sharing and electronic bulletin boards. Further, cadets will be required to submit course work electronically. This cavalcade of communications capabilities offers a decided change to cadets who have not been allowed telephones in their dorm rooms.

All communications and application functions are host-resident on the 8650s. Users have access to a menu-driven suite of services, including E-mail, electronic desk calendar, bulletin boards, file transfer and print management functions. The personal computers perform terminal emulation to access E-mail, calendar and bulletin board functions. Contel chose DEC's All-In-One software for that purpose.

For file transfer and print management, the personal computers act as intelligent devices and are able to access host-based information through a customized file-transfer protocol developed by Contel. Contel also developed the customized communications software. The company acted as a systems integrator rather than as a local net vendor, bringing together equipment from a variety of vendors.

The network is designed exclusively for academic use and will eventually be tied into computer systems on campus other than the 8650s. The academy uses a variety of computers such as the Data General Corp. MV 200, Harris Corp. 800, Control Data Corp. Cyber and AT&T 3B2. Prior to the deployment of Falcon Net, students had to use terminals in student computing centers that ran off these hosts, or they had to use their own stand-alone personal computers.

Steve Esselstein, field operations manager for telecommunications at Stanford University in Stanford,

Calif., said he considers Falcon Net to be one of the larger local networks in the academic world. Stanford also is planning a student broadband network that will eventually support about 1,000 users, but at this point, the network is still in the planning stages.

The concept of Falcon Net was born in late 1982, when the academy realized that its existing computer facilities would not satisfy future academic objectives, said Falcon Net Project Manager Col. Erlind Royer, who is a professor and head of the Air Force Academy's electrical engineering department.

"We conducted a study of our projected computing requirements and found 13 shortcomings in what we were planning to do," Royer said. "After looking at all the options, we decided that requiring students to buy the same microcomputers so that they could all operate over the local-area network would be the best solution."

All 1,370 incoming freshmen cadets this year were required to purchase IBM Personal Computer AT-like Zenith Z248 personal computers, and all of them will have access to the network. Currently, the network is supporting 2,300 personal computers, according to Royer. All faculty will have access to the network using the Zenith personal computers. Upperclassmen will be allowed to purchase the personal computers but will not initially be guaranteed access to the network.

The Air Force Academy looked at a variety of local network technologies before awarding the 2-year contract to Contel. The desire to integrate video and data over one network drove the decision to implement a broadband network. "We expected to pay about 25% more for broadband, but through competitive bidding, I think we paid the same for broadband as we would have for a baseband system," Royer said. ▢

San Diego from page 1

against the county of San Diego," county officials decided to try again. They instituted a new bidding procedure and issued a request for proposal. "We decided we should proceed, but this time we would approach the problem a little differently," said Richard Jacobsen, deputy chief administration officer for the county.

The county first hired an engineering firm to study communications needs. Then, a committee of county officials and telecommunications experts winnowed an initial field of 11 bidders to three, from which the County Board of Supervisors, assisted by the consulting firm of Booz, Allen & Hamilton, Inc., ultimately selected Contel Business Networks.

Contel beat out finalists AT&T Information Systems and a combined effort by Pacific Bell and Pacific Telesis Group to win the \$12.6 million contract, which was awarded in January. The Atlanta, Ga.-based company began work on the network last February. By March 1987, Contel expects to complete installations of 21 Northern Telecom SL-1 digital private branch exchanges, one video switch and a microwave backbone serving 10,000 voice and 200 data lines.

Currently, San Diego County's telecommunications service is supplied by Pacific Bell through eight Centrex systems. According to Thom Brown, San Diego County's deputy director of communications, the new \$12.6 million system is expected to save county taxpayers at least \$44 million in the 10 years following installation. Following the 10-year period, ownership of network switches and transmission facilities will be transferred to the county from Contel.

Much of the expected savings will stem from a reduction in long-distance costs afforded by the microwave transmission facilities, Brown said. "When I came on board

in 1982, we were looking at a telephone bill that was more than \$2.25 million a year," he said. "It's now up to \$7 million per year, and it will continue to go up."

The hub of the network will be a Northern Telecom SL1-XM series PBX capable of supporting 20,000 lines to be housed at the County Operations Center. The remaining PBXs will be distributed throughout the county, Brown said. The system will include centralized switch and transmission monitoring and control capabilities through the SL-XM.

Contel will provide service and maintenance during the first year of the contract. Then, according to Brown, the county can decide whether it wants to retain that arrangement or find another means of maintaining and servicing the network. Contel has agreed that it will not raise its fees for nine years if it is chosen as the service vendor following its mandatory year of service and maintenance.

Besides reducing costs by using the network's microwave facilities to transmit long-distance calls, county officials hope to save taxpayers' money by using the system's video capabilities.

San Diego County spans more than 4,300 square miles — nearly the area of the state of Connecticut — and county officials expect the new network to reduce transportation costs by allowing officials, staff and residents to attend meetings via videoconferencing.

In addition, county court arraignments will be held at six regional centers, reducing travel expenditures for court and sheriff department personnel as well as for prisoners, Jacobsen explained. He said the system will be a full-motion, closed-circuit interactive link connecting the locations, which include three regional centers, the downtown courthouse, a county operations center and the county administration center. ▢

Diskless from page 2

power. The people with personal computers are probably not going to like it."

As the purchase and installation of networks becomes a corporate rather than a localized decision, diskless personal computers are becoming more attractive because of their low cost, according to Harvey Freeman, vice-president of the consulting firm Architecture Technology Corp. in Minneapolis.

"We have IBM Personal Computers and compatibles on our network and we ordered most of them without disk drives," Freeman said.

Users still need some computers with disk drives on a network because they may want to run applications that are not available in network versions, he added.

Tom Quinn, president of Santa Clara Systems, which was acquired last week by Novell, Inc., agrees that low cost is one of the key attractions of the diskless personal computer.

"We believe we're being evaluated against dumb terminals. If the diskless personal computer had a

cost advantage such as a dumb terminal has, the sale of network nodes would increase."

This week Santa Clara Systems is expected to unveil the diskless personal computer it has developed in conjunction with Novell. The Intel Corp. 8088-based personal computer, priced at \$695, will feature a programmable read-only memory (ROM) that will allow the computer to boot from a server, said Quinn.

The role of technology

As usual, technological advances have played some part in making the diskless personal computer viable.

"The key to everybody jumping into the market is the remote boot ROM," Kimtron's David said.

Traditionally, personal computers have booted from a disk drive; diskless personal computers need code in ROM to boot. Developing this code is not an easy task, David said.

3Com's Bob Metcalfe prefers the term "network station" over diskless personal computer because many so-called diskless personal

computers can actually accommodate a disk drive.

A network station is a computer that "when it was designed, was influenced by the fact it was going to be on a network," said Metcalfe, senior vice-president and general manager of 3Com's New Product division.

In an increasing number of cases, being a network station means having a network interface card built into the computer.

In the personal computer market, Apple Computer, Inc. pioneered by building its AppleTalk network interface into the Macintosh. Vendors of engineering workstations, including Sun Microsystems, Inc. and Apollo Computer, Inc., have provided built-in network connections for years.

3Com has supported diskless workstations on its Ethernet network since early in 1984. Last month it began shipping 3+Start, new software for supporting diskless personal computers.

Although several vendors cited security as a key reason users are interested in diskless personal com-

puters, the lack of a disk drive will not prevent users from stealing corporate data. Users can copy data from their screen, dump it to a printer or find a system with a floppy disk drive to which they can download data. As Metcalfe points out, MS-DOS currently presents its own problem: "Data you can use is data you can copy."

Drawbacks of diskless

Despite their advantages, no one expects diskless personal computers to dominate the personal computer market any time soon. A number of software programs still use copy protection schemes that require the user to insert a key disk into a floppy drive to use the software.

In addition, many users need to transport data between work and home — currently carried on floppies.

Perhaps more difficult to counter is simple habit: personal computer users are comfortable with the independence their personal computers provide and are loath to give that up. ▢

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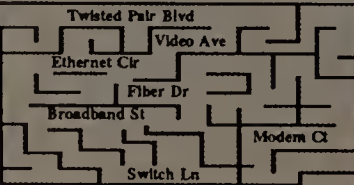
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Nov. 10-14, Las Vegas — Comdex/Fall '86. Contact: The Interface Group, Inc., 300 First St., Needham, Mass. 02194.

Nov. 11-13, Washington, D.C. — Digital Transmission and Switching. Contact: ABC TeleTraining, Inc., P.O. Box 537, Geneva, Ill. 60134.

Nov. 12-13, New York — World Update: Winners' Circle '87. Contact: The DMW Group, Inc., Seminar Division, 2020 Hogback Road, Ann Arbor, Mich. 48104.

Nov. 12-13, Washington, D.C. — Advanced Voice Technologies. Contact: Phillips Publishing, Inc., 7811 Montrose Road, Potomac, Md. 20854.

Nov. 12-14, Boston — SNA Architecture and Implementation Seminar. Also, Dec. 3-5, Sunnyvale, Calif. Contact: Communications Solutions, Inc., 992 S. Saratoga-Sunnyvale Road, San Jose, Calif. 95129.

Nov. 12-14, Boston — Northeast Lightwave Exposition. Contact: Lightwave, 235 Bear Hill Road, Waltham, Mass. 02154.

Nov. 13-14, Los Angeles — Networking Personal Computers. Also, Dec. 15-16, New York. Contact: New York University, School of Continuing Education, Seminar Center, 575 Madison Ave., New York, N.Y. 10022.

Nov. 13-14, Chicago — Data Communications: The Fundamentals of Network Design. Contact: Digital Consulting Associates, Inc., 6 Windsor St., Andover, Mass. 01810.

Nov. 13-14, Washington, D.C. — Satellite Technology for the Non-Technical Manager. Contact: Phillips Publishing, Inc., 7811 Montrose Road, Potomac, Md. 20854.

Nov. 17, New York — Data Broadcasting Technology. Contact: Waters Information Services, Inc., 34 Chenango St., Binghamton, N.Y. 13901.

Nov. 17-19, San Francisco — Managing the Strategic Data Planning Project. Also, Dec. 17-19, Boston. Contact: Software Institute of America, Inc., 8 Windsor St., Andover, Mass. 01810.

Nov. 17-19, Stamford, Conn. — Telecommunications Markets: The Impact of IBM. Contact: Chris Sherman, International Resource Development, Inc., 6 Prowitt St., Norwalk, Conn. 06855.

Nov. 17-19, Atlanta, Ga. — The

Thirteenth Annual Computer Security Conference. Contact: Computer Security Institute, 360 Church St., Northborough, Mass. 01532.

Nov. 17-20, Salt Lake City — Eighth Interservice/Industry Training Systems Conference. Contact: Col. P.J. Cole, National Security Industrial Association, 1015 15th St. N.W., Suite 901, Washington, D.C. 20005.

Nov. 18-19, Boston — PC Coordinator Workshop. Also, Nov. 20-21, Detroit; Nov. 20-21, Washington, D.C.; Dec. 11-12, Detroit; Dec. 10-11, Los Angeles. Contact: System Resources, 123 North 4th St., Minneapolis, Minn. 55401.

Nov. 18-20, San Francisco — Localnet '86. Contact: Online International, 989 Avenue of the Americas, New York, N.Y. 10018.

Nov. 18-20, Chicago — Switched Networks for Voice and Data. Contact: ABC TeleTraining, Inc., P.O. Box 537, Geneva, Ill. 60134.

Nov. 19, Washington, D.C. — Capitol Wo/Men in Telecommunications. Contact: Capitol Wo/Men in Telecommunications, P.O. Box 18035, Washington, D.C. 20036.

Nov. 19-20, Boston — Educational Seminar on T-1 Facilities and Networking. Contact: Timeplex, Inc., 400 Chestnut Ridge Road, Woodcliff Lake, N.J. 07675.

Nov. 19-21, San Francisco — Bypass Networking with Small Satellite Terminals. Contact: Technology Transfer Institute, 741 Tenth St., Santa Monica, Calif. 90402.

Nov. 20-21, Palo Alto, Calif. — Token-Ring Network & Application Program Interfaces Seminar. Contact: Communications Solutions, Inc., 992 S. Saratoga-Sunnyvale Road, San Jose, Calif. 95129.

Nov. 20-22, Chicago — The Sixth Chicago Computer Business Equipment Showcase. Contact: The Interface Group, 300 First Ave., Needham, Mass. 02194.

Dec. 8-10, Stamford, Conn. — Private Networks: Future Directions. Contact: Chris Sherman, International Resource Development, Inc., 6 Prowitt St., Norwalk, Conn. 06855.

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HORRELLSCOPES
BY EDWARD HORRELL

In communications today, it takes more than just good business sense to survive; it requires celestial guidance.



Aries: The sign of vision and innovation has designs on the latest form of computer input. There is nothing so irritating as getting up in the morning, reading in the newspaper

what the stars have in store for that day and hearing the toaster complain, "Something inside me is burning."

And everybody hates a sassy computer with a screen that displays its disdain for the user's mental capabilities: "Exiting program. Are you sure you want to do this? Enter yes or no."

Luckily, according to industry prognosticators, it won't be long before you'll be able to give orders to computers in addition to having them give orders to you.

International Data Corp., a market research firm in Framingham, Mass., projects that more than 20,000 voice-activated computers will be shipped in 1986. These computers recognize the user's speech and allow the user to input data by speaking rather than typing.

They are already in use to provide user password identification for security systems and to accept stockbroker requests for stock quotations.

Voice-recognition systems are coming down in price. They now range from \$4,000 to almost double that. When prices become more reasonable, the use of voice-activated computers will become widespread.

From there, it will be a mere skip of a computer chip to household appliances that respond to spoken commands.

User: More beer, please.
Refrigerator: Remember your diet, fatso.



Gemini: US Telecom, Inc. and GTE Sprint Communications Corp. proved that two companies are indeed better than one.

Duality characterizes Gemini and represents a plus for the new US Sprint Communications Co. And it sometimes leads stargazers, astrologers and even prognosticators such as Horrellscopes to make mistakes.

Such is the case with the union of US Telecom and GTE Sprint, formerly two of the biggest money losers in telecommunications. Horrellscopes predicted the downfall of the two.

Horrell is president of Mitchell & Horrell, Inc., a telecommunications consulting firm in Memphis, Tenn.

What actually resulted, however, was a combined company, US Sprint, that offers innovative services backed by creative advertising, a commitment to an all-fiber coast-to-coast network and price structuring that is giving its competitors astronomical headaches.

Long-distance companies will soon be running to keep up with US Sprint.



Taurus: There's no bull in MCI Telecommunications Corp.'s new 800 service. As everyone under the telecom zodiac knows, 800 service is inward WATS. And up until now, inward WATS was only available from AT&T or the Bell operating companies.

Now MCI will offer toll-free 800 service. This will provide a needed service to MCI's customers, probably at a lower cost than AT&T. But, consistent with the Taurean qualities of efficiency and competence, the move will also save MCI millions of dollars. Although not everyone knows it, MCI was one of the heaviest users of AT&T's 800 service.

Most companies thank their lucky stars for this type of product solution. They could save themselves dollars too.

Looking into the alignment of other planets, it is clear that US Sprint and Western Union Corp. will also offer an 800 service in the coming year. This will provide needed competition in the still-monopolized long-distance market.



Libra: The scales finally tipped too much for Federal Express Corp., and the express delivery company pulled the plug on its brave new venture — Zapmail.

The facsimile delivery service will end by February 1987.

Federal Express reported heavy operating losses from Zapmail and traded long-range plans for short-term savings. Apparently, the service required such a high level of use that it couldn't support itself.

The use of satellites in facsimile technology was key to lowering the price of Zapmail. Unfortunately, the Challenger space shuttle disaster made the future of commercial satellites uncertain at best.

However, on the other side of the scale, Zapmail did awaken the entire facsimile industry. It should be credited with spreading the use of facsimile devices, which have been hovering like unnoticed spacecraft over the business community for years.

Zapmail forced the fax industry to come up with enhancements and improvements. Look for new, bigger and better facsimile machines to appear in the sky in the near future.

And, incidentally, it would not be a shock to see Federal Express re-enter Zapmail in the race for space once the technological bugs have been worked out and costs can be reduced substantially.

Cosmic catastrophe of the month

AT&T must believe the interconnect industry is run by a herd of innocent sheep just waiting to be shorn.

AT&T Communications, the division that sells long-distance services for AT&T, has an 800 number that interconnect companies can call for help.

And the particular kind of assistance AT&T is so kindly offering is to help the interconnects make a sale. The number can be used for suckers . . . er, companies . . . wishing to request a joint interconnect/AT&T proposal for a sales prospect.

AT&T claims the interconnects can use AT&T's credibility to aid in clinching the sale. How kind. How incredible.

Who believes that AT&T, which competes with interconnects through its AT&T Information Systems division, is going to help the competition make a sale? Any of those who do, please call Horrellscopes at once. We have a nice, swampy planet we would like to sell.



Aquarius: The sign of the future shines brightly over the Federal Communications Commission's idea to allow cable television companies and telephone companies to operate jointly.

Aquarius is one of the most "human" signs in the zodiac. It rules in accord with infinite peace, love and progress.

Such progress is signaled by the FCC, which is re-examining the possibility that telephone companies might someday own cable TV franchises. This might not seem such a cosmic event until people stop to analyze the chances for good inherent in such an arrangement.

This means local telephone companies could offer cable television service to customers. The potential is limited only by the imagination of the companies involved.

For example, think of the benefits of tying the emergency number 911 into cable television to serve the elderly and handicapped.

Imagine further such advantages as directory assistance on the television screen, shopping channels connected to the boob tube or citywide security.

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Of course, we expect that once you've tried us, there'll be no temptation to leave.

Because if it's quality of service you're looking for, you simply can't do better.

(The nation's *largest* customer of private lines learned this recently, from a study that showed us the best of the half-dozen carriers it uses.)

An offer this good can't last forever. And the fact is, it ends December 31, 1986.

So there's not a moment to waste. Find out if you qualify as a new customer with sufficient traffic. Take this page and send it to the address below. Or call 800-526-7270, Operator Code 154.

And have a laugh at anybody you want.

ITT U.S. Transmission Systems, Inc.
100 Plaza Drive, Secaucus, NJ 07096.

Name _____ Title _____

Company _____ Address _____

City _____ State _____ Zip _____

Telephone _____

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